

3rd
EAR

CHEMICAL WEEKLY

VOL. XXXIII

JULY 5, 1988

NO. 43

8-22

11 JUL 1988

MYSORE

Chemox Chemox Chemox Chemox

METHANOL

ACETONE

CAUSTIC FLAKES & LYE

NITRO BENZENE

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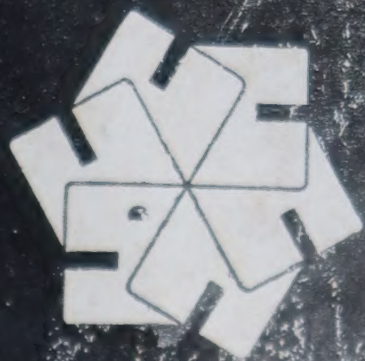
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JUL 1988

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Formaldehyde 37%

Methanol -- RCF

Tanker Load & Drums

Acetone (HOC) (Tanker Load & Drums)

T.B. Linear Alkyl Benzene (LAB)

Para Tertiary Butyl Phenol (PTBP) (Japan)

Melamine

N-Butanol

Isobutanol

Isopropanol (IPA)

Phenol

Methylene Chloride

Aniline Oil

Nitro Benzene

Cellosolve (Belgium)

Propylene Glycol

Thionyl Chloride (Imported)

Octanol (2-Ethyl Hexanol)

D.O.P.

PVC Resin Suspension Grade

Caprolactum (Bayer)

Ethylene Vinyl Acetate (EVA)

Sulphamethaxole

Thiamine HCl (for A.U. only)(Vitamin B1)

Cloxacillin Sodium (for A.U. only)

Hydrazine Hydrate

-- W.Germany

-- Brazil/Yugoslavia

-- Belgium/Netherland

-- Dow, American

-- Japan

-- Takeda, Japan

-- Singapore

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Adipic Acid
Pyridine Pure 2°
PVC Resin Suspension 67-D
Gum Rosin N & WW Grade

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Alfol-1618-H
Hydrogen Peroxide 30%
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Gallic Acid 99.5%
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Methylene Chloride
Graphite
Cellosolve
Acrylamide
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Paraformaldehyde 91%
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Laboratory & Reagent
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Orthotoluidine
Sodium Chromate
Chrome Oxide
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N-Methylaniline
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Telex: 0185 201 ARCM IN

- BOMBAY** : Scent House, Station Road, Goregaon (West), Bombay-400 062.
Phone: 6722280, Gram: AROSILVASSA, Telex: 011-78077 FAIS IN
- KANPUR** : Chemdet Enterprises, Shop 67, 75/232, Sabji Mandi, Kanpur.
Gram: SCENTOUS, Telephone: 64551
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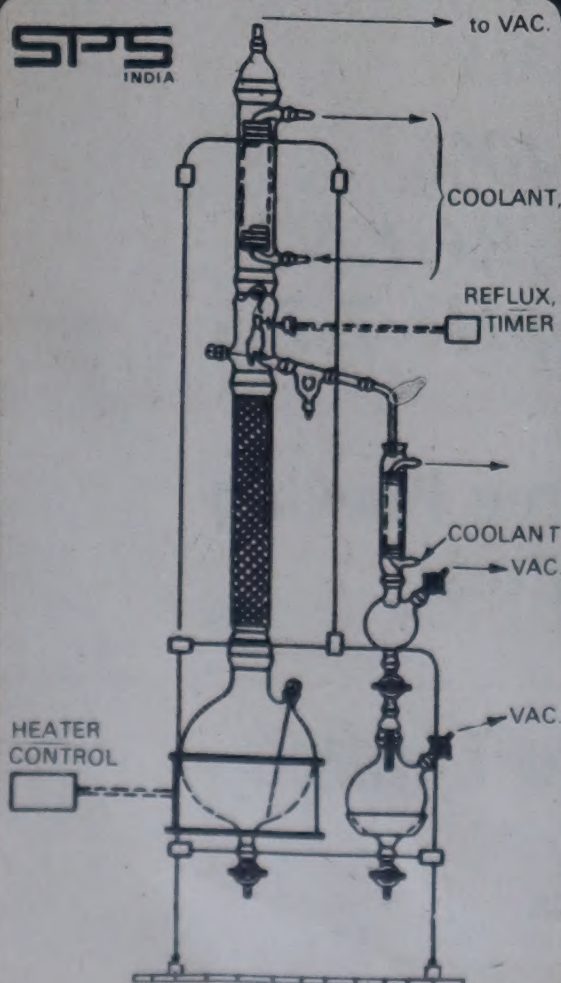
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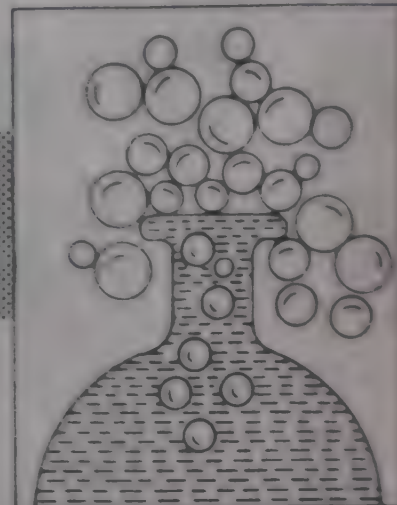
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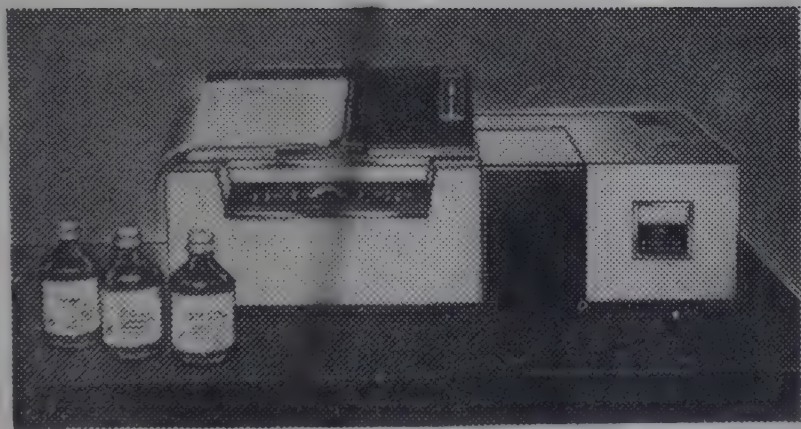
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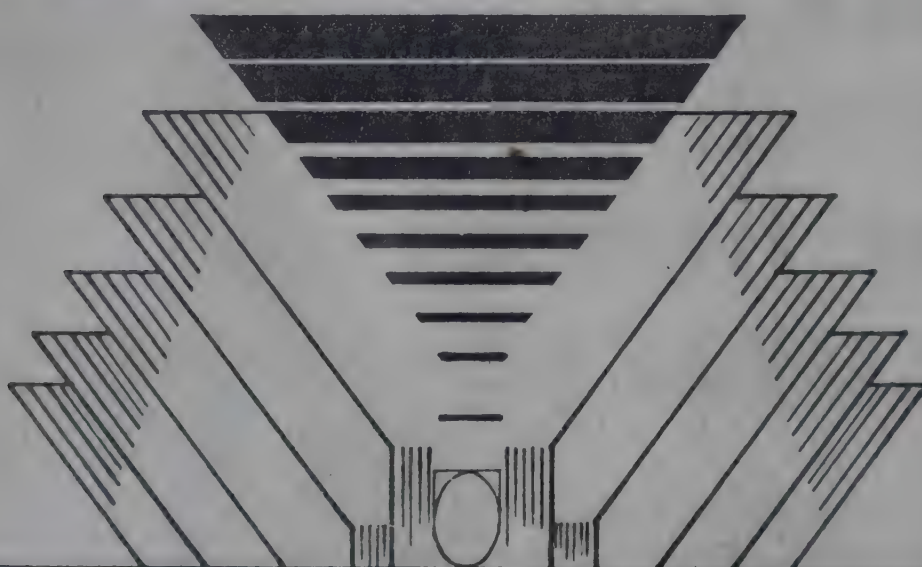
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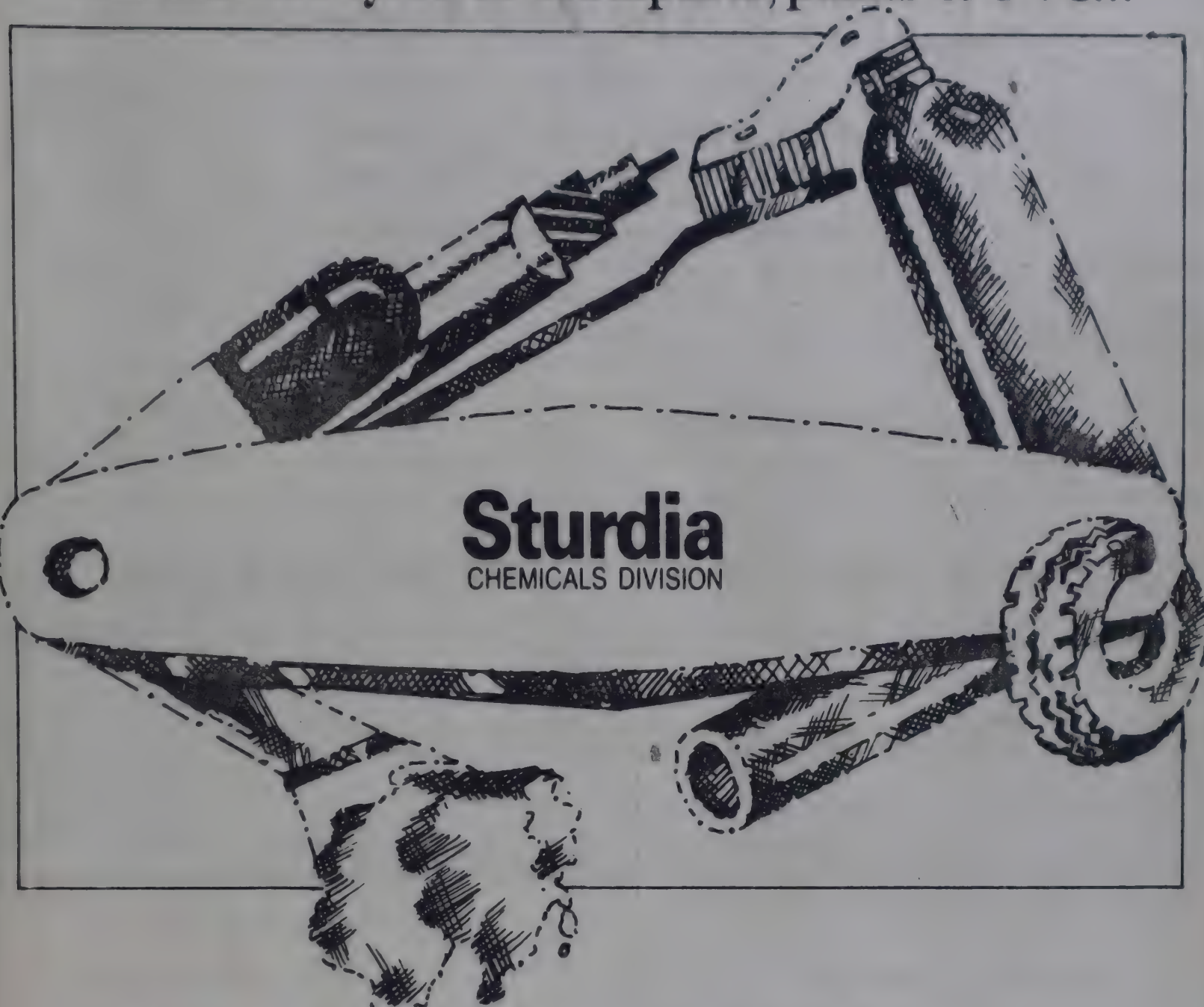
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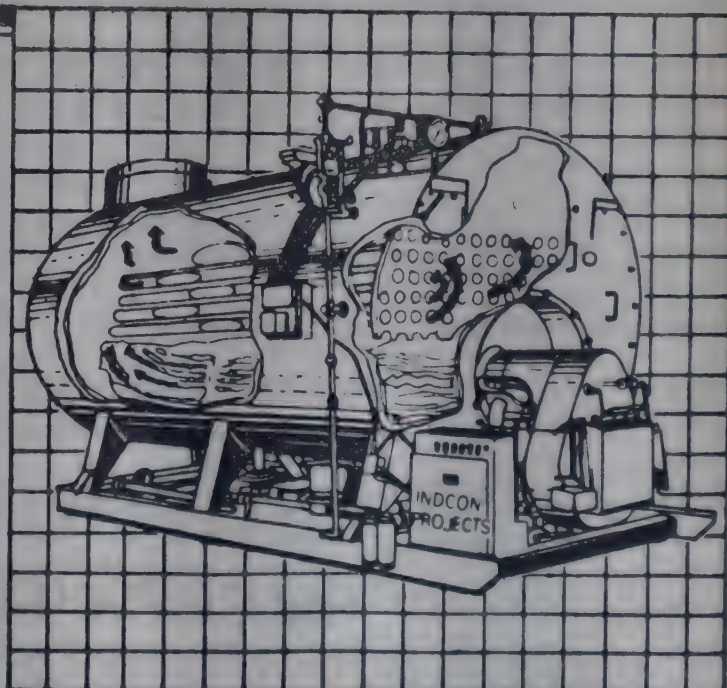
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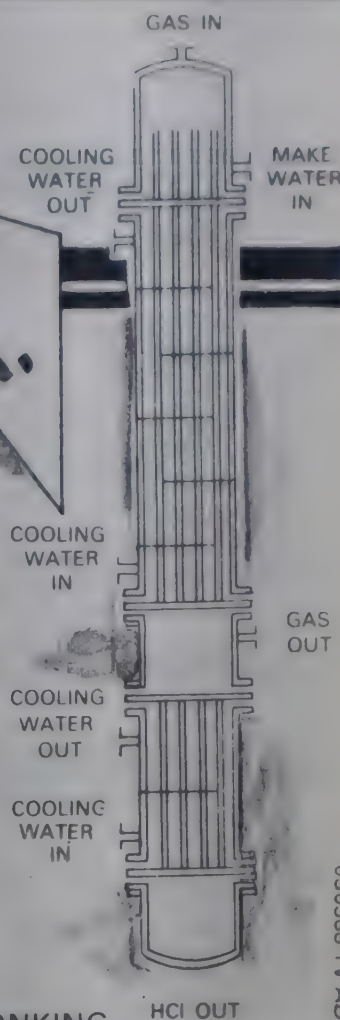
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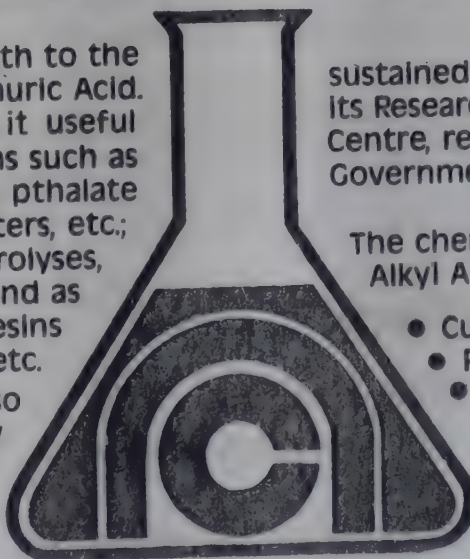
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Energy Scene -- Global Considerations

The Energy crisis confronting the world was only dimly perceived a decade and half ago. The oil embargo of 1973, natural gas shortages in the USA in the winter of 1976-77, the contribution of energy costs for inflation and recession have all been the subject of international debates. More recently the decreasing oil price, supply gluts and a shaky Organisation of Petroleum Exporting Countries (OPEC) combined with world wide recession have led to a feeling of complacency that energy is no longer a problem of consequence.

The long range energy problems have been comprehensively examined by international agencies, well qualified to undertake such reviews. The earliest one, Energy in transition (1985-2010) from the National Research Council of the US National Academy of Sciences mainly dealt with US background of 1979. World energy outlook published in 1982 by the International Energy Agency (IEA) of the Organisation for Economic Cooperation and Development (OECD) reviewed the problem upto 2000 AD but mainly for the IEA countries.

'Energy in a Finite World' from the International Institute of Applied Systems Analysis (IIASA) concerned itself with global scene upto 2030.

It is necessary to understand the key fact that energy systems are basically inert. Many of the key technologies upon which the energy system rests, such as oil refineries, coal mines and electricity generating plants have life times of the order of 30 years; hydroelectric projects may have life times of the order of 60 years. Therefore, two life times or approximately 50/60 years may be required before major technological transformations take place. Market penetration thus is seen to proceed with glacial speed. Historically for a new energy source to increase its share of the market for a few percent to a significant fraction of the primary energy market typically takes fifty years.

The worldwide average per capita power consumption is of the order of 2KW. The world of 2030 may have a population of 8 billion people -- which will require 16,000 one-thousand megawatt plants involving the fuel requirement of 225 million barrels of oil per day or its equivalent of other fuels, say coal.

Present power consumption is severely maldistributed with a majority of the world population utilising only 0.2 KW per capita. With economic development, the per capita average can grow to 3, 4 or even 5 KW. This will call for 480 to 1200 quads (10^{15} British Thermal Unit). The US consumption for 1982 was 73 quads and the projection for 2000 for 93 quads. Estimated capital requirements to produce the 2030 supply works out to \$30 to \$50 trillion in today's dollars and averages about 4% of the gross world domestic product.

Some optimists predict that the world can sustain these staggering demands; but others are horrified at the unimaginable despoliation of nature that this might result in. The long range concerns are that even this level of demand cannot be indefinitely sustained. The inference is obvious. It is suicidal to depend on any one source or technology to meet the growing energy demand.

Worldwide oil reserves are estimated at 6.7×10^{11} barrels whereas global conventional oil resources are estimated at 2.3×10^{12} barrels. At present, two-thirds of the oil in known fields remains unrecovered. Primary recovery and secondary recovery taken together leave two thirds of the oil in the ground! With regard to the technology for enhanced tertiary recovery development and field testing, most of the work has essentially come to a halt under the present climate.

As conventional oil resources continue to diminish, one naturally turns to unconventional sources, mainly heavy oil, tar sands, oil shale etc. The technology for exploiting these unconventional oil resource is still in its infancy. The worldwide resource base is estimated to be another 2.3×10^{12} barrels from these sources.

Natural gas is one of the most attractive resources, with its primary and secondary forms being identical. It is clean, and easy to distribute. Worldwide resources of natural gas are assessed at 280×10^{12} cubic metres. The magnitude of this resource is not well established. World coal resources are estimated to be 300,000 quads whereas reserves of approximately 1800 quads at economic prices are said to be easily available. At somewhat higher costs the reserves expand to 9,000 quads. But no significant new mining technology has emerged.

To improve efficiency, lower costs and reduce environmental impacts, a number of new approaches to coal combustion are under development.

Fluidised bed combustion in atmospheric and pressurised form is expected to achieve a major breakthrough for increased coal usage without environmental hazard. Combined cycle generation also shows good deal of promise for higher efficiency and cleanliness. This is inherently one of the most efficient power cycles available. Another approach involves a coal gasification unit producing medium BTU gas at the first stage. Coal to electricity efficiencies of 45% are likely to be achieved by these systems.

Fuel cells convert energy to electricity through electrochemical rather than thermal means. They are highly efficient and may prove to be a dependable source of energy in future. Cogeneration of electricity and heat is a potentially attractive way of conserving fuel in small and medium sized coal fired units. Synthetic gas from coal is an old technology which was dropped when natural gas became available through long distance pipelines. This may be revived.

Magneto hydrodynamic generation is another technique in which electricity can be produced from coal without the need from a turbine by using the electrically conducting properties of the hot gases. It is expected to be commercially feasible in the immediate future. Coal liquifaction or the production of synthetic liquid fuels has long been theoretically understood. Coal is a hydrocarbon in which the hydrogen to carbon ratio is low, oil is hydrocarbon in which the ratio is higher. The general aim of all liquifaction processes is the addition of hydrogen by some means to liquify coal. The approaches to this problem fall into four categories: indirect liquifaction, pyrolysis, solvent extraction and catalytic liquifaction.

Indirect liquifaction is in common use in the Sasal plants in South Africa. This has low thermal efficiency and may not be practised widely outside South Africa. The pyrolysis process involves heating coal in absence of oxygen with hydrogenation being accomplished by the hydrogen from coal itself or by introducing a stream of hydrogen gas. Since the product slate is of a poor quality this may not gain acceptance.

Solvent extraction technique depends on pulverised coal mixed with a hydrogenation solvent to get additional hydrogen. Separation of the unreacted coal and ash also has proved to be a difficult problem; catalytic liquifaction can avoid this problem by suspending the coal in heavy oil. The heavy oil serves as an additional hydrogen donor. To sum up, coal remains the most valuable resource though its utilisation is beset with a number of problems.

Nuclear energy has been the topic of most heated controversies since the fifties. The workhorse of the nuclear industry is the LWR, in common use in the USA, the raw material being uranium. The impetus for the development of breeder reactor comes from the recognition of the fact that using the 10,000 one giga watt (GW)

LWRs in a once through cycle will exhaust the global resources of uranium supply by 2030. Anyway the future development of nuclear energy are dominated by problems concerning costs, regulation, safety, risk assessment, waste management, radio active release, nonproliferation policies. The future is not clear.

Solar energy is a comprehensive term encompassing a broad range of processes for converting solar heat into high temperature heat, low temperature heat, and elective power. The average input from the sun is equal to 178×10^6 GW, which is 10,000 times more energy than is being produced by all the electricity generating stations of the world.

Photovoltaic systems are finding increasing acceptabilities but storage barriers are coming in the way. Wind powered generators are gaining popularity at specific sites. Solar thermal systems focussing Sun's radiation on large boilers have been demonstrated. Ocean thermal energy conversion using naturally occurring temperature gradients offer distinct future possibilities.

Production of solid, liquid and gaseous fuels by using solar radiation offers a number of options. Use of biomass, photochemical conversion using photolyres and many others are under debate. The use of solar collectors to replace the nuclear heat source is a challenging basic research work. In general most of the solar technologies are still in the R & D stage.

The source of geothermal heat is believed to be arising in the earth's crust. Estimates of potential is around 100,000 quads, an estimate which is speculative in nature.

Major categories of geothermal energy are hot water reservoirs, natural steam reservoir, geopressured reservoirs, hot dry rock, molten magma etc. Here again, easily exploitable geothermal sources have been tapped. In depth R & D studies alone can determine further development.

Controlled Nuclear fusion is a major technology with enormous potential. The basic process of controlled nuclear fusion, involving fusion of light hydrogen isotopes, deuterium and tritium is well known. An estimate of the energy from deuterium in the ocean is 10^{12} KW for one billion years. Thus here is a promise of an indefinitely sustainable energy source. Research on confining plasmas -- highly ionised gases, the natural state of matter at temperatures of 100 million degrees Kinetic temperature is under way in the majority of the developed countries.

It is difficult to capture the essence of potential advances that can be made in this sector which is crucial for our growth. The message is clear. Nature provides and will continue to provide energy to meet the insatiable demands of man, if only he learns to unlock the mysteries of nature, without despoiling and ravaging nature.

-- T.P.S. RAJAN.

CHEMARENA

S.L. VENKITESWARAN

Major Explosions Tighten Supplies

Closely following the recent explosion at Hoechst Celanese acetic acid plant in Texas comes news of an even more disastrous explosion at Shell Oils Norco Refinery in Louisiana on May 5, which has put out two steam crackers making a million tonnes of ethylene a year. This has wiped out 6% of US ethylene capacity and a major dislocation of ethylene supplies in an already tight situation. Ethylene production is reported to be about 16.5 million tonnes in USA with plants operating at over 95% of capacity and prices booming since early 1987 -- doubling to 58 to 66 cents a Kg. in a year. There is a scramble for ethylene and derivatives and Shell has cut supplies to 40% for major contractual buyers. There is selectivity also coming into the supplies in favour of polymer production as against ethylene oxide/glycol. This disaster has emphasised the need for one or two new large production centres for ethylene in USA.

The Norco Refinery is said to be one of the very well run plants with a creditable safety record and the cause of this disaster is under investigation. Presumably it had originated in a fluid cracking unit and a fire followed and spread leading to the extensive damage to neighbouring units. The toll is said to be seven killed and over 40 injured, half of them residents of Norco. Power units, pipelines and other equipment have been damaged and restart may be several months and at indefinite schedules.

Another explosion this time in a perchlorate rocket fuel plant of Pacific Engineering and Production Co. at Nevada, US is likely to affect rocket fuel oxidant and per-

haps the schedule of future space shuttle programmes which had a major setback 2 to 3 years earlier when the Challenger spectacularly exploded soon after take-off. Defence missiles and other space launch projects may also be affected.

Ammonium perchlorate is the oxidant for rocket fuels and is made from ammonia and sodium perchlorate which is in turn made by electrolysis. There are reportedly two plants of which Kerr McGee is larger. Each space shuttle booster is said to need 500 tonnes of solid propellant of which 70% is AP, 16% is atomised aluminium powder as fuel, 12% is polybutadiene/acrylic acid/acrylonitrile resin as binder. The explosion at Pacific Engineering was reportedly in a gas pipeline and not in the plant but it will be months before production can be reestablished. The Armed Forces of USA are reported to need 24,000 tonnes of the booster fuels and Morton Thiokol is the producer drawing upon the ammonium perchlorate and other supplies from others and major use is for MX strategic missiles -- perhaps this build up of missiles may be discontinued after the recent Super Power treaty. But the space shuttle programme is one of prestige and future strategy.

India has had no major explosions in chemical plants but only in ammunition dumps (Jubbulpore). One of the earlier explosions in recent years was the blow-up at Herdilia Chemicals' phthalic anhydride plant and more recently of glyoxal and nicotinic acid plants which use nitric acid for oxidation. But the record of heavy water plants is dismal.

Plastic Guns?

Mention of plastic guns reminds one of toys but real plastic guns for use as deadly weapons are not far off. This has created serious misgivings in those agencies entrusted with the safety of airport and aircraft and other sensitive installations. Handguns made of non-detectable polymers with only a metallic inside liner can escape detection by the X-ray scan or metal detectors. An Australian gun manufacturer Glock Inc. with his Glock 17 -- a 9 mm semi automatic handgun has created this sensation but the gun has one pound of steel with

83% of metal by weight and therefore not such serious concern. But further developments can upset things. The column by Jack Anderson in *Washington Post* mentioned that these guns were being delivered to the bete noir of US President -- Mr. Gaddafi of Libya.

US is now proceeding with legislation to ban such polymer-based guns which cannot be detected by airport security equipment. But some external parts of guns are already being made of plastics and should not come

under the ban. Technology and engineering capability are said to be on hand for guns from advanced polymer composites and hightech ceramics with metal parts only for a few small springs. Moreover terrorists are satisfied with guns which can fire a few times and then be thrown out. Reinforcing materials like glass or carbon fibres are adequate for such weapons. Guns which have to be

durable have to withstand pressures of 20,000 psi and high temperatures for which a liner is essential to reduce the wear of the barrel. The proposed legislation specifies at least 3.7 oz. of stainless steel and ability to show up on X-ray scanners though these may change in the final bill which may be approved. The days of real plastic guns may not be far off.

Price Trends for Petrochemicals

Petrochemicals are linked to natural gas -- methane and L.P. Gas -- naphtha -- from C_5 up to gas oil -- and therefore prices of petrochemicals depend on the availabilities and prices of these feedstocks. The supplies and prices of these are related to crude oil prices and the demand for fuel distillates, the major outlet. At one stage in the late seventies the crude oil prices were forecast to reach \$35 per bbl. in the early eighties but this did not happen and prices declined sharply. This has led to a lot of optimism on petrochemicals production and prices which now requires to be toned down by the realities under the ground.

World crude oil consumption is in the region of 60 million bpd and production is also at this level. The growth rate in consumption is an average 3% per year and the basic question is whether the production can be sustained to meet this rising level for the rest of this century. Production is expected to start declining in USA and centrally planned economies and only OPEC production will have to rise from the level of 55 million bpd to a level of nearly 72 million bpd by 1995 and even higher later on. We can imagine the consequences. The world crude oil reserves are said to be 703 billion bbls and of this half is in Middle East about 10% each in North America, Europe and Africa and lower quantities elsewhere. India's position is insignificant. OPEC has the reserves and capacity to meet the deficits elsewhere but at what price? The years of recession and stream lining energy demands are nearly over and the prices for oil have moved up and are predicted to reach over \$35 per bbl by 1995. The control over prices and supplies will inevitably shift to the Gulf countries -- more especially Saudi Arabia and UAE, also Iran and Iraq if their war mercifully ends. The era of \$45 per bbl for crude oil is not far off.

Of the naphtha availabilities of 733 million ton per year now threefourth is used as fuel and 13% goes for aromatics and 11% for steam cracking, the primary petrochemical pathway. Aromatics are increasingly in demand for fuel blends since incorporation of TEL for octane boosting is being phased out. There can be little doubt that the petrochemical producer will be able to outbid the fuel sector for specific grades of naphtha required for aromatics or olefines. The prices of products will therefore rise but the industry can afford such rise.

The other dominant feedstock for olefines is LPG and here too the price levels which the chemical sector can afford are higher than for fuels. The total amount of ethane, propane, butane used worldwide is 144 million tpa now and only 20% goes for olefines. The revised limits on Reid Vapor Pressure of gasoline in USA will release larger quantities of C_3 and C_4 from fuel blends and therefore leave these for use for chemicals. 1.3 billion m^3 of gas are produced worldwide and only 6% goes to chemicals -- ammonia and methanol. The newer technologies of chemicals via methane or synthesis gas will not greatly increase the present 1% use of methane for organics.

There is every reason to believe that petrochemical prices are sure to rise steadily in the coming years due to higher prices for the feedstocks and no alternatives of lower costs in sight except in small quantities in specific locations -- coal or renewable resources.

The use of polymers and chemicals will be sustained on their performance and the affordability of higher prices by the consumer. The era of low costs which boosted the development of petrochemicals has given way to an era of maturity and performance.

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ICMA-WESTERN REGION AGM

Call for a more knowledge oriented development

Whenever we talk about chemical industry, there is a spectre of pollution and damage to the environment. There is almost one-to-one equation that chemical industry means danger, and this wrong impression needs to be rapidly changed, said Shri S. G. Kale, Secretary, Industries Department, Government of Maharashtra while speaking as the Chief Guest at the Annual Meeting of the Western Region of the Indian Chemical Manufacturers Association (ICMA) held at Bombay on the 27th June 1988. Chemical industry is a very old industry in the world and while dangers associated with the chemical manufacture must have been there even at that time, after the tragic Bhopal incident the public seem to have become suddenly conscious about the dangers which are magnified further by the large scale operations in the industry. It is now for the chemical industry to rectify its image, he said.

Complimenting the ICMA for its various efforts in educating the personnel

engaged in the industry by organising seminars and training programmes, by bringing out booklets on safety measures etc, he suggested that as these booklets were in English, efforts should be made to bring them out in vernacular languages also to carry the message to the workers at the shop floor level.

Shri Kale observed that it was their experience in Maharashtra that the incidence of sickness amongst small-scale chemical units was comparatively high and the same needs to be examined. Referring to the widespread shortage of water in most parts of the urban areas in the country, he suggested that the Indian chemical industry, as a very large consumer of water, should think of converting waste water into usable water by processes like reverse osmosis, to help conserve nation's available water resources to the maximum extent. He reminded that drinking water requirements and water for irrigation would always be recip-

ing high priorities as compared to the requirements of the industry.

The Secretary said that in States like Maharashtra and Gujarat where certain level of industrialisation has already been achieved, more knowledge and technology intensive industries would be welcome, and this was particularly so in urban areas where land and water were becoming more and more scarce. He pleaded for continuous dialogue between educational institutions and industries, as in other developed countries, to achieve this goal.

Shri S. M. Datta, President ICMA, in his welcome address, as the outgoing Regional Chairman, Shri Ashok M. Kadakia could not be present at the meeting stressed the importance of the chemical industry in the western part of the country. He said that this region could justifiably be proud of its significant achievements and its stake was so high that whatever happens in the chemical industry, here decides the national fortunes of the industry. Shri Datta stated that the ICMA attaches highest importance to the aspects of industrial safety, health and environment and its activities during the last year laid considerable stress on these areas.

Shri Kishore V. Mariwala Regional Chairman-Elect, proposed a vote of thanks.

DHARAMSI MORARJI CHEMICAL

Dharamsi Morarji Chemical Company (DMCC) has bagged a prestigious order from Nirma Pvt. Ltd. for the supply of a 400 tonne per day sulphuric acid plant to be located at Mandal near Mehasana in Gujarat.

The scope of the assignment includes the supply of know-how and detailed engineering, supply of equipment, fabrication, erection and commissioning of the plant which will also have oleum manufacturing facilities.

This is the largest single stream soda sulphuric acid plant to be supplied with indigenous knowhow by an Indian company and is scheduled to be completed within a period of 12 months.

DMCC will shortly be commissioning the 800 tonne per day single superphosphate plant for Pyrites Phosphates and Chemicals Ltd, a public sector company at Amjhore in Bihar.



Shri S. G. Kale, Secretary, Industries Department, Govt. of Maharashtra delivering his address at annual meeting of the Western Region of the Indian Chemical Manufacturers Association (ICMA). Seated to his left are: Shri S. M. Datta, President, ICMA and Dr. O.P. Mittal, Hony. Secretary & Treasurer. Seated to his right are: Shri K.V. Mariwala, Regional Chairman Elect and Shri G.G. Nayak, Executive Secretary, Western Region, ICMA.



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PTFE import norms to be made tougher

The Union Government has decided to tighten the norms for import of polytetrafluoroethylene (PTFE), a superior variety of engineering plastics. The decision has been taken with a view to protecting the only domestic producer of PTFE against large-scale dumping of this raw material by leading foreign companies.

In addition, a proposal to invoke the provisions of the anti-dumping law in the case of PTFE supplies by the foreign companies in New Delhi is now being considered by the Government. Enforcement of anti-dumping law will ensure that the errant foreign companies cannot sell PTFE in India at 'dumping' prices.

The decision to offer protection to the domestic producer of PTFE, Hindustan Fluorocarbons Ltd (HFL), was taken at a high-level inter-ministerial meeting held in New Delhi recently.

As per the decision, import of PTFE would be placed under Appendix-3 of the Import Policy, which has the list of items which can be imported after getting due certification of domestic non-availability and authorisation by the Government.

Appendix-3 contains the list of permissible items of raw materials. Earlier PTFE imports were allowed under the open general licence (OGL).

The internal committee of the office of the Chief Controller of Imports and Exports (CCI and E) has also concurred with the decision of shifting PTFE to Appendix-3. Necessary notifications by the Commerce Ministry are expected soon.

The proposal for invoking provisions of the anti-dumping law has been discussed by representatives of the Department of Chemicals and Petrochemicals and the Finance Ministry. No final decision has been taken on this issue, but there are indications that a favourable decision would be taken soon.

At present, necessary data are being collected by the Government to build a case for dumping by the foreign companies, so that the provisions of the anti-dumping law can be invoked.

In the event of the Government deciding in favour of invoking the anti-dumping law provisions, the duty on import of PTFE would be increased by a margin that would make the landed cost of this raw material too prohibitive.

The existing fiscal and physical controls on import of PTFE are easy and its foreign suppliers are taking advantage of it by dumping it on the Indian market. The easy controls have facilitated import of PTFE at a landed price, which is about 10 per cent lower than the price of that domestically produced.

As a result, domestic users of PTFE prefer imports to meeting their needs from domestic sources.

The Government has decided to tighten the import norms, as it was only in July, 1987 that the country's first PTFE plant went into production. But the plant, located in Andhra Pradesh, has not been able to withstand competition from the imported variety.

The PTFE plant was launched with an annual capacity of 500 tonnes with a view to obviating the need for imports of this raw material, which has a wide spectrum of applications in the chemical, electronic and engineering industry as also in the strategic areas of defence, space research and nuclear research.

The present domestic demand for PTFE is estimated at 300 tonnes.

But the demand will go up once the raw material gains recognition in more areas of application.

The State-owned Hindustan Organic Chemicals (HOC) decided in the early eighties to join hands with the Andhra Pradesh Industrial Development Corporation (APIDC), which had a letter of intent for PTFE, to set up the plant at Rudaram, 44 km away from Hyderabad.

A new company in the name and style of HFL was incorporated in July, 1983. Its equity was contributed by HOC (51 per cent), APIDC (11 per cent) and the remaining 38 per cent by the public. At present, HFL produces and markets PTFE in 11 different grades in granular, dispersion and filled forms.

PARAXYLENE FOR PTA GETS DUTY EXEMPTION

The government has decided to exempt paraxylene from excise duty if it is consumed within the factory for the manufacture of purified terephthalic acid (PTA).

In a notification issued by the Union ministry of finance, the government has now extended the excise exemption on paraxylene for the manufacture of PTA also, i.e. if it is consumed within the factory of production.

This concession was available to paraxylene when used for the manufacture of DMT. The IPCL and Bongaigaon Refineries were the beneficiaries of the duty exemption. Now it has been extended for the manufacture of DPA, which is being produced for the first time in the country by Reliance Industries.

The exemption will be from 33 per cent countervailing duty and 15 per cent excise duty on the manufacture of PTA from paraxylene.

The benefit works out to be 4,400 per tonnes or a total of Rs. 55 crores per annum on an estimated PTA production of about 1.25 lakh tonnes by Reliance.

MAGNESITE FIND IN JAMMU

Union Minister for Steel M. L. Fotedar said that large reserves of magnesite and dolomite had been located in Panthal area of Udhampur district in Jammu region and his ministry planned to start commercial exploitation of these soon.

Magnesite and dolomite are used in the production of high grade steel and the exploitation of these reserves in Jammu would prove a boon to the country's steel industry, the minister said during an informal chat with newsmen at the end of his three-day official visit to the state.

Fotedar said the country was earning Rs. 500 crore of foreign exchange annually from the export of iron ore from Baladila alone.

Soviet knowhow for HOC's MDI project

The Soviet Union has agreed to supply knowhow for the MDI (Diphenyl methane Diisocyanate) project of Hindustan Organic Chemicals Ltd. MDI is a raw material for the production of polyurethane foams and plastics for which India is now totally dependent on imports.

MDI and TDI (Toulene Diisocyanate, intermediates for the manufacture of rigid and flexible polyurethanes, respectively are closely-held technologies shared by about half-a-dozen manufacturers in the world.

HOC has been keen on entering this field for quite some time as the major raw materials, aniline and formaldehyde for MDI and nitrotoulenes for TDI are captively available at its Rayani complex.

The giants in the field include BASF and Bayer in Germany, Du Pont and Dow Chemicals in the US and Japan's Mitsui Group. Most of them are understood to have refused to part with their know-how. A well-known Italian firm was willing to supply TDI know-how for the present, but not the MDI technology, according to one source.

The Soviets have offered to transfer technology for the entire range of polyurethanes. Mr. H. Krishnamurthy, HOC Chairman and Managing Director, said he hoped to strike a deal with the Soviets before the year-end, after working out all details. Meanwhile, the company has undertaken a study of the scope for rigid and flexible polyurethane applications in the country.

India today consumes around 1000 tonnes of flexible polyurethanes and 3000 tonnes of rigid polyurethanes. These are not imported as MDI but as prepolymers which are processed with polyols in the presence of a catalyst to produce the required polyurethane (PU) foam. Unlike in the West, where rigid PUs have a larger share of the market, flexible PUs have a better market in India at present because of their widespread use in mattresses.

Rigid PUs have bright growth prospects in India. With its attractive strength to weight ratio and anti-friction properties, it promises to be an economical replacement for rubber rollers. It is already used by Godrej and Allwyn for refrigeration insulation, and its use could extend to trucks, vans, rail wagons, grain silos, pipes and tanks.

It is also used in aircrafts for interior panelling, wing tips, ailerons, fuselage insulation, radar covers for ground tracking etc. Its applications in the automobile industry include car bumpers, instrument panels and steering wheels and roof insulation. It also serves a number of strategic functions for naval equipment.

Apart from its insulation properties, rigid PUs have superior, heat resistance, excellent adhesion to metals, glass, fabrics and the like, ability to form intricate and shapely moulds and

a closed cell structure which minimises water absorption.

Besides bedding, flexible PUs may be used for furniture, seat cushioning in autos and aircrafts, joining of broken bones, toys, rollers, tyres, elastomers, shoe uppers and soles and the like.

HOC plans to put up 10,000 tonne plants each for MDI and TDI. The plants would require a common phosgene facility. As a poisonous gas, the need for phosgene production in the country was hotly debated after the Bhopal tragedy. A committee of experts which studied the issue concluded that as a feedstock for vital drug intermediates and chemicals, India could not afford to do without phosgene.

It recommended that licences be issued selectively subject to a number of rigid conditions to prevent a disaster. At present, Atul products is the only unit in the country manufacturing phosgene. HOC project would require around 20,000 tonnes of phosgene every year.

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LAUNDRY SOAPS, DETERGENTS:

Production fall on demand squeeze

The laundry soap and detergent market continues to shrink following the squeeze on demand during the long drought spell last year.

Production of washing soaps declined by 14 per cent from 1.25 lakh tonnes in 1986 to 1.07 lakh tonnes in 1987. Consumption of detergents too fell from 2.07 lakh tonnes in 1986 to 1.95 lakh tonnes last year. Toilet soap production, however, increased by 13 per cent, for 2.39 lakh tonnes in 1986 to 2.69 lakh tonnes in 1987.

The Indian Soaps and Toiletries Makers Association attributes the declining trend in detergent production to the effects of higher prices resulting from steep increase in excise duty from 15 to 25 per cent during the drought year.

According to Mr. Adi B Godrej, Association President, the falling trend has worsened during the first quarter of 1988. The production of both soaps and detergents during the first quarter of the new year have been poor. The declines have been 22 per cent in laundry soap, 19 per cent in toilet soap and 29 per cent in detergents, he told the annual general meeting of the Association in Bombay on June 27.

He blamed the prevailing high cost economy for the fall in demand. "The high cost economy in our country, resulting from high import duties, high release prices of essential raw materials by the canalising agencies and especial-

ly the high excise duty of 25 per cent on many of our members' soaps are responsible for the declining trend," he said.

Mr. Godrej repeated the industry's plea to lower the maximum rate of excise duty on soaps and detergents to 15 per cent which should boost production and demand. He welcomed the doubling of excise rebate for use of rice bran oil in soap.

The Association has for years been representing against the "prohibitively high" excise duty of 105 per cent on toiletries and cosmetics. This, it believes, led to stagnation of the industry instead of the expected relief, the 1988 Budget led to an increase in the excise duty on toiletries and cosmetics because of the five per cent surcharge, Mr. Godrej said.

The Association has welcomed the Government's decision to import of oils and fats in time in order to avoid the acute shortages experienced in industrial oils last year. At the same time, it has protested against the increase of almost 40 per cent in the STC release price of crude palm stearin to member units.

He also pleaded for an upward revision of janata toilet soap which is supplied at Rs. 1.33 per tablet by six-member units to the public distribution system. Following a special request by the Government, the Association has

agreed to supply 200 tonnes in July at the current price. Industry Ministry has assured the Association that the price will be suitably amended.

The Association has sent a detailed representation to the Government urging certain steps to encourage the use of Alpha Olefin Sulphonates and Methyl Ester Sulphonates. It also hopes that the detergent industry would be brought within the ambit of the broad-banding policy.

FIRST PRIZE FOR HOC

Hindustan Organic Chemicals Ltd. a Government of India Enterprise, was awarded the first prize for its Annual Report 1986-87 by Association of Business Communicators of India at its Annual Award function held in Bombay on 18th June 1988. Mr. H. Krishnamurthy, Chairman & Managing Director of HOC received the award at the hands of Mr. S. L. Khosla, Chairman, Indian Oil Corporation Ltd.

New Office Bearers Elected

At the Eighth Annual General Meeting of CHEMICAL INDUSTRIES ASSOCIATION held on Saturday the 25th June 1988, Mr. S. Krishnaswamy has been re-elected as President with Mr. S. Lakshmiraghavan Dr. D.M. Mohanta and Mr. P.K.N. Panicker as Vice-Presidents, Mr. N. Venkateswaram as Secretary and Treasurer and Mr. T.L. Viswanathan as Joint Secretary and Eight Members as Executive Committee Members representing different areas.

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LAB price hikes rouse soap makers' ire

The two major producers of linear alkyl benzene (LAB) have begun jacking up their prices in unison, apparently taking advantage of the fact that they together account for 80 per cent of the total LAB manufacturing capacity in the country.

On the other hand, the only other producer of LAB, the State-owned Indian Petrochemicals Corporation Ltd (IPCL), continues to sell its products at the same price, which even earlier was lower than those of the two giant producers. In fact, against a hike by these two, IPCL reduced its ex-Delhi price by Rs. 640 per tonne soon after the Union Budget was presented this year.

The two giant producers of LAB are Reliance Industries Ltd and Tamil Nadu Petroproducts Ltd, which is a joint sector project promoted by TIDCO and PIC. The annual production capacity of these two LAB plants is 60,000 tonnes each. IPCL's annual production capacity is only 30,000 tonnes.

Reliance Industries increased the price of LAB from Rs. 21,000 per tonne to Rs. 23,000 with effect from June 6, 1988, while Tamil Nadu Petroproducts effected the increase by the same margin of Rs. 2,000 from Rs. 21,000 per tonne to Rs. 23,000 tonnes with effect from June 1. The exact dates of the price hike have been deliberately kept different to avoid legal complications that may arise if some aggrieved party moves the Monopolies and Restrictive Trade Practices Commission (MRTPC) for redressal.

The ex-Delhi price of LAB produced by Reliance and Tamil Nadu Petroproducts is now ruling at Rs. 27,487 per tonne, inclusive of excise duty, sales tax and other levies. But the ex-Delhi LAB price of IPCL is Rs. 24,307 per tonne. Before this price hike the price of LAB produced by Reliance and Tamil Nadu Petroproducts was also the same at Rs. 25,344.50 per tonne.

The small-scale manufacturers of synthetic detergents, particularly those located in north India, are perturbed over this development. They have questioned the manner in which the

two companies have jacked up the price without any reason.

The Detergent Manufacturers Association, which represents the small-scale detergent manufacturers of the Delhi region, has already written to the Director-General of the Union Industry Ministry to institute an enquiry into the manner in which the two major producers of LAB have jacked up their prices. It has pleaded that the "two monopoly companies" should be restrained from indulging in such restrictive trade practices, which are against the public interest.

The detergent manufacturers are perturbed as LAB is the basic raw material for the manufacture of synthetic detergents. Till January, 1988, LAB was being imported and was canalised through the State Trading Corporation (STC). In December, 1987, Reliance and Tamil Nadu Petroproducts started manufacturing LAB indigenously with annual capacities of 60,000 tonnes each, in addition to IPCL's production of 30,000 tonnes per annum.

As the Government felt the total capacity of 1,50,000 tonnes was sufficient to meet indigenous demand, STC stopped importing LAB, soon after the two plants stabilised their production. The basic price offered in the market by these two companies was Rs. 21,000 per tonne in December and the ex-Delhi price used to be Rs. 25,200 per tonne.

The Union Budget for 1988-89 did not provide any reason for a price hike, expect the introduction of the special excise duty at the rate of one-twentieth of the basic duty. Thus this duty hike of Rs. 157.50 per tonne was passed on to the consumers and the ex-Delhi price then went up to Rs. 25,344.50 per tonne. On the other hand, IPCL reduced its ex-Delhi price by Rs. 640 to Rs. 24,307 per tonne.

Within six months of their production, the two companies have now raised the prices once again. The small-scale detergent manufacturers allege that there is a clear case of collusion between the two producers. There is also no justification for the hike, as not only has IPCL refrained from any increase, but there has been no hike

in the price of the raw material used in the manufacture of LAB or in the freight cost, according to the small detergent makers.

These small units feel that the LAB price increase will have a cascading effect on the price of downstream products. Moreover, they fear that they have to contend with more such frequent and steep hikes in LAB prices in the months to come.

NEW PAINT FROM GOODLASS NEROLAC

Goodlass Nerolac Paints has introduced a new paint known as automotive refinishing paint.

The new paint is manufactured by the company in technical collaboration with Kansai Paint Company, Japan. Kansai Paints is providing the necessary technical knowhow on automotive coatings, including anodic and cathodic electro-deposition primers. The Japanese company has a 26 per cent equity participation in the company.

The company is the largest supplier of automotive paints (used extensively on cars, scooters, motorcycles, mopeds, light commercial vehicles and other vehicles) and the major supplier to Maruti Udyog, Hindustan Motors and Premier Automobiles.

Goodlass meets the special requirements of the automotive sector with range of custom-designed liquid paint systems, pre-treatment chemicals, powder coating systems and high performance surface coatings which are used by other industries as well.

The company also undertakes on-line monitoring and upgradation of installed paint systems.

PRINTING INK MANUFACTURERS' ASSCN

Annual General Body Meeting of The Printing Ink Manufacturers' Association, Madras held on 15.6.88 the following Office bearers were elected for the year 1988-89. Mr. M. Namasivayam President, Mr. T. Cheriyan Vice President, Mr. M.S. Aruldass Secretary, Mr. K. Gopalakrishnan Joint Secretary, Mr. J.M.G. Aleem Ahmed Treasurer.

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MANUFACTURE OF 6-APA DRUG INTERMEDIATE

Penicillin G base units in fix

Drug units making 6-APA, an intermediate based on penicillin-G are in a fix. A string of drug units have suddenly sprung up in the scene manufacturing 6-APA based on penicillin-V with a substantial cost advantage.

Drug units making 6-APA with penicillin-V have the advantage of importing their full requirement of penicillin-V at a lower price unlike drug units making 6-APA from penicillin-G.

The Government has already issued import licences for the import of 126 MMU of penicillin-V to three leading manufacturers.

Drug units making 6-APA based on penicillin-G on the other hand have to lift 40 per cent of their requirement of penicillin-G from indigenous sources at a price of Rs. 650 per BOU to get licence to import the rest of the penicillin-G requirement. The current import cost of penicillin-G works out to Rs. 275 per BOU.

Informed sources point out that manufacturers of 6-APA using

penicillin-G are thus finding themselves outpriced in the market now. Some of these units are already nursing huge stocks of 6-APA.

The government had introduced a policy of compulsory lifting of 40 per cent of the requirement of penicillin-G by 6-APA units from either Hindustan Antibiotics Ltd. or Indian Drugs and Pharmaceuticals Ltd. last year to liquidate the mounting stocks of public sector drug units.

The manufacture of 6-APA, started on a large-scale only a couple of years ago, has been mainly by using penicillin-G, a basic antibiotic manufactured in the country by HAL and IDPL.

The sources here point out that the drug units which had taken up the manufacture of 6-APA with penicillin-G as the base are now in a serious dilemma as they are unable to shift to the penicillin-V base. It would require a total change of the plant and process involving huge capital expenditure.

Besides quite a few drug units have already entered into long-term

agreements with foreign drug companies for the supply of penicillin-G.

The sources point out that the obvious advantage to the drug units using penicillin-V for making 6-APA would thus enable them to make unintended profits amounting to several crores of rupees.

The sources also feel that the government should rationalise the policy relating to penicillin-G and penicillin-V to achieve a steady trend in production of 6-APA. 6-APA is the penultimate intermediate of ampicillin and amoxycillin, two widely used antibiotics in the country.

MINOR LEAKAGE IN CARBIDE PLANT

"A minor leakage" from one of the field storage tanks containing residual chemicals in the Union Carbide pesticide factory in Bhopal on June 20 was "expeditiously" and "effectively" stopped and "there was no cause for alarm", it was officially stated in Bhopal on June 21st.

The state government has requested the Centre to arrange for removal of all residual chemicals to avoid recurrence of such leaks.

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3-year distribution policy for canalised drugs

The Government recently announced the distribution policy to be followed during July, 1988 to June, 1991 for allocation of canalised drug items appearing in Appendix-5-B of the import-export policy (1988-1991).

The new policy covers DGTD units, small-scale units, new small-scale units and loan licence units.

With a view to encouraging higher domestic production, each DGTD unit shall be entitled to receive canalised drug materials on the basis of formulation-wise capacities as indicated in its licence plus an item-wise annual growth of 25 per cent, under the new distribution policy.

In cases where no specific formulation-wise capacity is entitled in the licence the entitlement will equal the unit's entitlement of the preceding year. The item-wise growth of 25 per cent will be allowed when the licensed capacity is fixed or re-fixed and endorsed on the licence.

The calculations of entitlement in any year will depend upon the licensed capacity at that point of time plus 25 per cent thereof, and the licensed capacity, if at all changes, can change on the basis of re-endorsement/recognition of capacity, modernisation and automatic growth.

Unless the licence is reendorsed for the enhanced capacity, the original licensed capacity should be taken into consideration for working entitlement. The calculations of entitlement would be based on the capacities as indicated in the industrial licence and also drug manufacturing licence.

It would also be necessary to check whether drug manufacturing licence is available with the party in relation to which canalised items is being demanded.

In order to enable STC to take advance action to planning imports, the DGTD units should be requested to keep STC informed of the progress of consumption of canalised raw materials at least one month in advance of each quarter.

In line with Para 6(5) of the Import and Export policy, an indus-

trial unit whose capital investment in plant and machinery does not exceed Rs. 35 lakhs shall be treated as small-scale unit. The small-scale units may be asked to produce a certificate from a practising chartered/cost accountant regarding the total value of their plant and machinery.

A small-scale unit shall be entitled to get during 1988-91 canalised raw materials to the extent of item-wise entitlement for the year 1986-87 plus a growth factor of 50 per cent subject to a minimum of Rs. 5 lakhs. Similarly, it shall be entitled to get such material during the subsequent years on the basis of item-wise entitlement for the previous year plus a growth factor of 50 per cent.

A small unit will have the freedom to ask for any new item or items other than that received by such a unit in the previous year. For this purpose a small-scale unit shall be required to surrender its entitlement of any or each of the item in respect of which it had entitlement during the previous year up to 15 per cent per item.

A new small-scale unit shall be entitled to get canalised items not exceeding the total value of Rs. 7.5 lakhs.

In case of small-scale units set up in specified industrially backward areas, the maximum value of entitlement shall be Rs. 10 lakhs.

Loan licence units which do not have their own manufacturing capacity shall be entitled to get canalised raw materials for a value exceeding Rs. 1 lakh during the first year of their existence. Such units which have operated for one year shall be entitled to get canalised raw material for a value not exceeding Rs. 2 lakhs and those which have operated for two years shall be entitled to get canalised raw material for a value not exceeding Rs. 3 lakhs.

This facility has to be phased out by the end of the Seventh Plan, as per the new measures on drug policy announced in December, 1986. The facility of entitlement in the fourth and fifth year may be per-

mitted without any further enhancement in the entitlement.

In respect of newly-canalised (items which were not canalised during the previous year), the entitlement shall be on the basis of formulation-wise capacities as indicated in licence(s) plus an item-wise growth of 25 per cent.

In cases where no specific capacity of a particular formulation or formulations is mentioned in the licence, the entitlement of the DGTD units in the Indian sector shall be equal to the highest consumption during any one of the previous five years. In both cases once the capacity is fixed or refixed, the entitlement will be equal to such capacity plus an item-wise growth of 25 per cent.

In the case of DGTD units in the FERA sector (foreign companies) the entitlement shall be equal to the highest consumption during any one of the previous five years. In both cases once the capacity is fixed or refixed, the entitlement will be equal in such capacity plus an item-wise growth of 25 per cent.

The entitlement of canalised items required for production of non-drug items by both DGTD and small-scale sector units shall be on the basis of the highest annual consumption of the relevant canalised items during any one of the previous five years. For this purpose, the units shall be required to furnish to the canalised agency their actual consumption figures duly certified by a chartered/cost accountant.

UK FOR TIES WITH INDIAN CHEMICAL UNITS

Britain has shown interest in technology upgradation and establishment of joint ventures with Indian chemical, petrochemical and downstream industries.

A delegation of the 'Chemtech foundation' representing Indian entrepreneurs and technocrats from the chemical industry held talks with representatives of the British Chemical Industries Association at London. Representatives of the British trade and industries department also joined in the deliberations.

Study to measure workers exposure to chemicals

The public sector Hindustan Organic Chemicals Ltd. (HOC) has undertaken what is believed to be a pioneer study in determining the threshold limit values for chemicals in the Indian environment.

Threshold limit value (TLV) refers to the level for a particular chemical to which workers are exposed every day at a concentration which does not affect the health of a majority of them.

Most Western countries have determined TLVs for their chemical industries. TLVs can vary from country to country depending on climatic, physiological and nutritional differences.

Progressive chemical units and some of the State Pollution Control Boards in India follow the US TLVs. HOC has acquired a variety of sophisticated electronic gadgets and has begun building up a data bank which should, after some years, help arrive at appropriate TLVs for the Indian environment.

HOC's industrial health department, headed by Dr. P.D. Joshi, Chief Industrial Health Physician, collects air samples with the help of drager pumps with tinex tubes containing diphenyl paraphenylene oxide which traps the organic chemicals in the atmosphere irrespective of temperature, pressure and humidity.

These tubes are fed into gas chromatographs with attached thermal disruption mechanisms which separates the pollutants. The results of this analysis are juxtaposed with the metabolic studies on employees.

Benzene and its compounds are converted into phenol by the human system. Pollutants are generally detoxified in the liver and passed through the urine. Metabolites, (in this case the urine), are studied before and after exposure to the chemicals. Other tests include blood chemistry and blood pressure.

"We are trying to correlate the results of air sampling study, blood chemistry results and symptoms shown by some of the employees" Dr. Joshi said and added that if the symptoms are exhibited by only a few, it means they are allergic to

number of employees show the same symptom, it calls for a further study.

Dr. Joshi and his team are gathering data to determine Indian TLVs for benzene and nitro products handed by workers at Rasayani. Incidentally the concentration of chemicals in the HOC complex are well below the US TLVs. The US TLVs for benzenes and toluene are 30 mg. and 375 mg per cubic metre, respectively. Their concentration at HOC premises are 25.04 mg. and 188 mg. per cubic metre respectively.

CHEMICAL EXPORT TARGET RAISED

Encouraged by the growing demand abroad, the Chemicals and Allied Products Export Promotion Council has set a target of Rs. 538 crores worth of exports by 1990.

It would be about 25 per cent more than what the Council had achieved last year.

Under the expansion programme, the council expects to export Rs. 462 crores worth of products this year, an increase of about Rs. 50 crores over 1987-88, and reach Rs. 538 crores in 1989-90.

It also hopes to attain a record level of Rs. 1,500 crores by the turn of the century.

According to Council sources, the massive world-wide demand for chemical and allied products itself provide a good opportunity for building up exports. That apart, a number of variable factors have helped the Council increase its exports. These include a rapid shift of industries from the developing world, and the rising labour cost in Japan and South Korea, which have also been adversely affected by the revaluation of their currencies.

In order to achieve a significant boost in exports, the Council has stressed the need for certain supportive measures from the Government, which include modernisation, additional CCS on exports by air and a lowering of the export packing credit rate.

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Paracetamol exporters hit by input price rise

Concerned action by European manufacturers to drive India out of the South-East Asian paracetamol market has hit Indian exporters.

Indian manufacturers, who had penetrated this market in recent years, complain that chemical giants like Hoechst, Bayer, BASF and Rhone-Poulenc have teamed up to retrieve their lost markets.

European manufacturers have reasons to be piqued by India's small-scale exporters. In many cases, Indian exporters used to lift the raw material, para nitro chloro-benzene (PNCB), from the same European manufacturers.

Paracetamol made from imported PNCB used to compete with European paracetamol in the South East Asian markets. Europeans now have grown wise and have jacked up PNCB price and simultaneously, reduced the price of paracetamol.

PNCB quoted around \$600 only two years ago, now rules at \$1800 per tonne. The price of benzene, raw material for PNCB, has remained more or less stable around \$340 during the period. "This shows that PNCB price is not related to feed-stock price and has been deliberately hiked to hurt Indian exporters," complains Mr. Ramu Deora of Triochem Products Pvt. Ltd., a leading manufacturer who pioneered the export of this analgesic.

Rhone-Poulenc of France recently grabbed an order for 50 tonnes from Bangladesh, a traditional buyer of Indian paracetamol. The French company quoted \$5 per kg. compared to \$5.50 quoted by Indian suppliers. Other neighbouring markets where India is being ousted include Sri Lanka and Thailand. China has added a new dimension by quoting \$4.50.

The main Indian exporters are Triochem, Thomsons, Dinesh Chemicals and Sri Krishna, all small-scale units. Some of them had doubled their capacities in view of the growing export potential. They are now in a bad shape following the rise in PNCB price and reduction in world price of paracetamol.

What has really hit them is the long delay in the advance licensing system. They had contracted for PNCB when the prices ruled below \$1000, and now the price has gone up to \$1800.

India exported about Rs 10 crores

worth of paracetamol, both tablets and powder last year. The total production is now estimated in the region of 4000 tonnes a year.

Hindustan Organic Chemicals Ltd. the sole manufacturer of PNCB, exports large quantities but there is no scheme to supply PNCB at near international prices to exporters. Mr. Deora, who is also Chairman of Chemexcil and President of the Federation of Indian Export Organisations (FIEO), says paracetamol is only an example from a host of chemicals where public sector units export raw materials and exporters of finished goods import the same.

"This anomaly continues despite liberalisation in exim policy", he lamented. FIEO has proposed that all public sector units, including IPCL, HOC and SAIL should supply intermediates which they export, at international prices to exporters holding advance licences.

Another novel suggestion is that ten percent of a public sector unit's output should be reserved for supply to exporters at global prices. How will they recoup the loss involved? "The loss incurred in supply

of ten per cent of production to exporters should be loaded to the remaining 90 per cent of the local sales", according to the FIEO proposal.

LEATHER EXPORTS WILL CROSS \$5 BN MARK BY 2000 AD

Leather exports from India would cross \$five billion (US) by the end of this century, Mr. Raghu Dayal, joint secretary in the Union commerce ministry.

Inaugurating the 'American lifestyle' leather exhibition, organised by the leather industries of America and the council for leather exports, he said the target was very much within the reach of the Indian leather industry. He said the Centre would adopt a very pragmatic approach and extend all possible help to the leather trade to boost exports.

He urged the leather industry to look for leather substitutes as the demand for leather was going up while its availability was limited.

Dr. John D. Stampel, US consul-general in Madras, said the two-way trade between India and his country would touch \$six billion (US).



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Substandard drugs

The Union minister of state for health, Ms Saroj Khaparde, has announced the government's decision to set up a Drug Authority of India with powers to license production, check quality and punish the offenders. This is a right move in the context of the growing menace of substandard and spurious drugs. Simultaneously, the crime branch of the Maharashtra police has registered cases of "culpable homicide not amounting to murder", against seven drug manufacturing companies. This action follows the report of the Lentin Commission which enquired into the death of 14 patients at a Bombay hospital in early 1986. The cases have been registered under the IPC and the Drugs and Cosmetics Act.

This is, perhaps, the first time in the history of the drug industry in India that a case of "culpable homicide not amounting to murder" has been registered against it. The Maharashtra government has also published in newspapers the names of about 800 drugs found to be "substandard" by its food and drug administration. While the manufacture and marketing of spurious

drugs are the handiwork of criminals, some of the leading drug manufacturers in the large as well as the small sector have, on occasion, been caught releasing substandard drugs.

This is unfortunate, for the drug industry has come of age and has proved its capacity to export its products even to quality-conscious markets. Enforcement of quality and the punishment of offenders are the responsibility of the drug control agencies of the state governments. The obvious failure of these agencies to arrest the spread of substandard and spurious drugs is due to grossly inadequate manpower and testing facilities and corruption at some levels. The proposed Drug Control Authority of India will be effective only if it is safeguarded against such deficiencies. Another area which calls for reform is the Indian pharmacopoeia which is a hotch-potch of the pharmacopoeia of different countries. The drug industry has pointed out that many of the standards prescribed cannot be complied with purely on practical grounds.

'The Economic Times'

Sops for mineral industry likely

The Government is considering the extension of concessions under Section 80 HHC to the mineral industry, according to the Minister of Steel and Mines, Mr. M.L. Fotedar.

Speaking at the 22nd annual general meeting of the Federation of Indian Mineral Industries (FIMI), at New Delhi on June 18, he said that although the benefits of the EOU scheme have been extended to the mining and mineral-based industry, the units have failed to avail of the facilities. This is because mineral ores are incapable of physical customs bonding. The Government is examining the problem, Mr. Fotedar said.

However, he did not mention how these constraints could be overcome, by emulating the example of the Kudremukh iron ore company, which according to FIMI enjoys a 100 per cent EOU status. This is exactly what FIMI has been demanding from the Government.

As regards cases for grant of mineral concessions and renewal of leases, the Centre has asked the concerned States to grant the party in question six months to fulfil addi-

tional requirements and submit mining plans, respectively, Mr. Fotedar said.

The Minister claimed that the Indian Bureau of Mines has been asked to prepare mining plans for the country within a definite timeframe. About 500 persons have been identified for this purpose so far, he said.

With reference to freezing of railway freight and port charges, Mr. Fotedar observed that minerals are already classified at lower rates, as compared to steel and mineral oils, in the railway freight structure.

However, as there has been a 10-12 per cent rise in input cost in railways every year and the input costs of ports are also increasing. As such, freezing freight charges is not feasible. "We have to learn to live with these realities," Mr. Fotedar said.

The minister, however, congratulated the mineral industry for the rise in value of mineral production during 1987 as compared to the previous year.

Mr. Fotedar called upon the industry to ensure the implementation of a sound environmental plan and

to ensure greater productivity and cost reduction.

CFL STAKE SALE MOU WITH HINDUJAS DENIED

The Management of Coromandel Fertilisers Ltd., at Hyderabad has categorically denied any knowledge of an understanding arrived at by its foreign promoters — Chevron Chemicals Corporation and International Minerals and Chemicals Corporation — with the London-based Hindujas regarding the sale of their combined holding in CFL.

Chevron Chemicals Corporation and International Minerals and Chemicals Corporation — both US-based outfits — jointly own 44.5 per cent of the CFL stock.

Speaking on behalf of the US companies, whose representatives were resent in connection with a board meeting, Mr. P. V. S. N. Raju, general manager (co-ordination) of CFL, refuted reports appearing in a section of the press about a memorandum of understanding (MoU) between the Hindujas and Chevron Chemicals Corporation and International Minerals and Chemicals Corporation covering the purchase of Coromandel Fertilisers stock.

However, the CFL management confessed knowledge of bids made by the Grindlays Merchant banking division to acquire the 8.5 per cent holdings with the Andhra Pradesh Industrial Development Corporation (APIDC) — possibly on behalf of the Hindujas — in the last few months.

BIHAR HAS LARGEST COAL RESERVE

Bihar has the largest coal reserve among states with over 57,570 million tonnes against Orissa's more than 32,662 million tonnes and West Bengal's 30,022 million tonnes, according to an estimate by the Geological Survey of India.

The GSI sources said that India's total coal reserve stood at over 1,70,460 million tonnes including a proven strength of 49,376 million tonnes.

Madhya Pradesh has 26,853 million tonnes, Andhra Pradesh 10,435 million tonnes and Maharashtra 5,075 million tonnes.

The coal reserves in north eastern states of Assam, Meghalaya, Arunachal Pradesh and Nagaland had been estimated at 280 million tonnes, 459 million tonnes, 90 million tonnes and 12 million tonnes respectively.

MRTPC pulls up Roche Products

The Monopolies and Restrictive Trade Practices Commission has declared as unfair trade practice the claim being made by Roche Products Ltd. in their advertisement that the use of ferro redoxon could result in a six-fold increase in iron absorption.

The commission gave the following reasons for its conclusion.

The absorption of elemental iron from ferro redoxon can go up by 100 per cent only by reason of the presence of 200 milligram of ascorbic acid (i.e. Vitamin 'C') and not six-fold. The advertisement is silent about this.

The statement/advertisement hides the fact that this claim relates to enhanced iron absorption from the daily food one takes.

The statement/advertisement also hides the fact that six-fold increase in absorption of non-haem iron was witnessed only in the course of experiment on maize meal when supplemented with ascorbic acid.

It hides the fact in case of meal containing fish or meat when supplemented with vitamin 'C' the increase in the absorption of non-haem iron can be in the neighbourhood of only 1.7-fold.

On May 5 the Commission issued an ex parte temporary injunction restraining Roche Products Ltd. from continuing with the tall and false claims in its publicity campaign to promote the sale of ferro redoxon.

The company was asked to show-cause as to why the injunction order should not be continued till the disposal of the inquiry.

The counsel for the company said that the claim made by the company was absolutely correct and so the interim injunction should be withdrawn.

Detailing the medical aspect of the phenomenon, Mr. D.C. Aggarwal and Mr. H.C. Gupta, members of the Commission who formed the bench said that where the iron in the food was in haem or ferrous form the addition of ascorbic acid would not raise the iron absorption proportionally to any appreciable degree because even without vita-

min 'C' the absorption of iron was adequate.

Even if the claim made in the impugned advertisement be taken to be in reference to food and not in reference to ferro redoxon, the generalisation was so unqualified that addition of 25 milligram of ascorbic acid would increase iron absorption three-fold and addition of 200 milligram would increase absorption six-fold could not hold good for every sort of diet.

Referring to the submission that the advertisement was in the medical journals and meant for the information of the medical practitioners, the Commission said even a medical practitioner was likely to be misled by the assertion in support of which the authority of Mr. L. Hallberg had been cited.

CHANGES IN TRADE POLICY

Modifications have been announced in the trade policy to make replenishment licence more useful, for registered exporters.

Rep. licence issued to export houses/trading houses, on their own exports, will also be valid for the import of samples.

Rep. licence issued during the preceding licensing year, will also be valid within their over-all value for the import of items, permitted in the statement of import policy for registered exporters, subject to have value restrictions, if any, in cases where the rep. licence relates to the export products corresponding to the same items in Appendix-17, provided the items to be imported is not already covered by the licence or it is subject to a value limit which is more restrictive than the limit permissible for import.

If the CIF (cost insurance freight) value of the rep. licence, which are surrendered to the licensing authorities concerned as unutilised, with a minimum balance validity of three months, will not be deducted from the FOB (free-on-board) value of export for the relevant year for the purpose of calculation of net foreign exchange earnings for that year.

Within the overall flexibility, the rep. licence issued to export houses/

trading houses on their own exports will also be valid for the import of samples not exceeding two in number, subject to a maximum total value of Rs. 1 lakh. Under this flexibility, samples of consumer items appearing in Appendix-II Part-B (excepting in the case of garment and leather items) to this policy, shall not be allowed. For this purpose, the licences will be endorsed as "the licence is also valid for import of samples subject to the condition laid down in para 215-A of the trade policy.

Within the overall flexibility, the additional licences issued to export houses/trading houses will also be valid for the import of samples not exceeding four in number, subject to a maximum total value of Rs. 2 lakhs, including Rs. 25,000 for samples of consumer items.

RAMAGUNDAM SUPER THERMAL POWER PLANT SYNCHRONISED

The thermal power generation in the southern region received a boost with the successful synchronisation of the first 500 mw unit of the Ramagundam Super Thermal Power project. The unit was synchronised a month ahead of schedule, by Mr. P.S. Bami, chairman and managing director, National Thermal Power Corporation Ltd.,

This is the first 500 mw unit in the southern region and the sixth under NTPC. The others are situated at Singrauli (two), Korba (two) and Rihand (one), according to an NTPC release.

With this synchronisation the installed capacity of the Ramagundam project has gone up to 1100 mw, consisting of three units of 200 mw and one unit of 500 mw capacity. The total generating capacity of NTPC has now gone up to 6,010 mw.

Construction is afoot for two more 500 mw units at Ramagundam. These will be synchronised within the Seventh Plan itself, taking the ultimate capacity of Ramagundam to 2,100 mw. According to the schedule, the next 500 mw unit is slated for synchronisation during 1989-90 and the last unit during 1990-91.

SOL to export bulk drugs to US

Standard Organics Ltd. (SOL) has received approval from the Food and Drugs Administration (FDA) for the export of bulk drugs to the US market, following a visit by FDA representatives to the company plant at Hyderabad a few months back, says a SOL press release issued in Bangalore on June 14th.

The company has been manufacturing bulk drugs like sulphamethoxazole, trimethoprim and salbutamol sulphate for over eight years and has been exporting them for the past three years. Exports of sulphamethoxazole moved up from 81 tonnes during 1985-86 to 250 tonnes during 1986-87 (an increase of 112 per cent) and were expected to go up by another 45 per cent during 1987-88 by touching 250 tonnes.

The press release states that apart from the thrust on boosting exports, the company had also substantially increased its turnover in the domestic market. SOL's gross income had moved up to Rs. 11.10 crores during the half year ended December 31, 1987, as compared to Rs. 6.58 crores during the half year ended December 31, 1986. The

profit-after-tax stood at Rs. 57 lakhs for the half year ended December 31, 1987, as compared to Rs. 28 lakhs for the half year ended December 31, 1986. The increase in turnover and profits was also reflected in the provisional accounts for the nine-month period up to April 30, 1988, with a gross income of over Rs. 17.5 crores and a profit-after-tax of over Rs. 82 lakhs.

ASPRO-NICHOLAS DISINVESTS 40 PC

Piramals acquire Nicholas Lab

Piramals (Morarji Mills group) have acquired the management of Nicholas Laboratories Ltd. following the purchase of 24.8 per cent equity from the company's foreign collaborators.

Four more nominees of Piramals were co-opted on the board of Nicholas Laboratories. Mr. Ajay Piramal, who was inducted on the company's board in March last, has now been appointed vice-chairman of the company.

According to Mr. Ajay Piramal, the Reserve Bank has granted permission for the sale of the entire 40 per cent

The press release stated that the improved profitability had been brought about by fully exploring areas of cost reduction, as well as by improving yields in the manufacturing process. The inhouse R & D facility was being tapped for venturing into production of new items as well as for improving the margins on existing items. The company was said to be poised for all-round growth, with a major thrust on both domestic and export markets.

shareholding of Aspro-Nicholas Ltd. UK at the rate of Rs. 45 per share (Rs. 10 paid-up). Of this, 24.76 per cent has been sold to Piramals, and 2 per cent are reserved for the employees of the company.

The balance will be offered to Indian shareholders in the ratio of 1 share for 50 shares held at the price of Rs. 45 per share. The offer for sales is likely to be made in September.

Piramals have acquired the controlling block through their investment company, Swastik State Deposits Ltd. They are planning to pump in additional funds for expanding pharmaceutical facilities. Although the firm's plans are yet to be finalised, the thinking seems to be to go for the manufacture of bulk drugs. The company's financial position is very sound and its borrowings are negligible. It would therefore, have no problem in raising borrowings to finance the expansion programme.

Mr. Piramal has visualised good prospects for the company. Its sales are expected to be around Rs. 20 crores for the current year ending June 30, 1988, against Rs. 71.55 crores in the previous year. The turnover for 1988-89 is expected to exceed Rs. 25 crores.

Mr. Piramal has said that the company would continue to have professional management. A new managing director of the company will be appointed shortly in the vacancy caused by the retirement of the chief executive, Mr. D.M. May, a few weeks ago.

Mrs. Purvi Ashok Piramal, Mr. Deepak Parekh, Mr. Bharat Taparia and Dr. A. Dastur, four nominees of Piramals, were co-opted on the company's board at the meeting

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POLYMERS PURCHASE FROM GLOBAL MARKET

Adoption of limited bid suggested

The adoption of "limited invitation to bid" procedure in place of open tendering, the narrowing down of preferential duty and periodical revision of import duty rates in tune with the international price movements are among the recommendations of a high-level Indian delegation that visited Western Europe, the US and Brazil in its first spell of worldwide scouting for supply sources of petrochemical intermediates.

The report of the team assumes greater importance in view of the country's desperate search for polymers in the world market to feed thousands of plastic processing units, craving of basic inputs.

The delegation, which has tied up the supply line for the last quarter of the current year, and for the next year, and has suggested measures to woo global suppliers to India, has however, noted that the country cannot depend on imports and, in the long run, it has to build its own production base for these materials. Imports are not going to be easy in view of the non-availability of polymers in the world market and their high prices. In fact, the delegation has foreseen the worsening of the situation.

India is facing a shortage of 9,000 tonnes of various kinds of polymers in the current year — LDPE 93,000 tonnes, HDPE 98,000 tonnes, PVC 117,000 tonnes, polypropylene 50,000 tonnes and PP 16,000 tonnes.

By 1994-95, the demand for different polymers in the country is projected to go up to 17,13,000 tonnes, against which the indigenous supply could be just enough to meet 50 per cent of this demand.

In view of the acute shortage of petrochemical intermediates in the international market, the government had deputed this delegation to discuss and tie-up, on a long-term basis, the supply of polymers in India with the major producers and suppliers.

The delegation, was led by Mr. J. Bakshi, acting chairman and managing director of IPCL, and comprised of Mr. I.N. Doshi, joint secretary, and Mr. Raghubir Singh,

director (finance) of the department of chemicals and petrochemicals, Mr. B.D. Chatterjea, general manager (marketing) of IPCL, Dr. N.M. Dhuldhoya, managing director PIL, Mr. K. Dharam, managing director of Nocil, Dr. R.V. Reddy, chief general manager of the STC and one representative each from the All-India Plastic Manufacturers' Association and the Organisation of Plastic Processing Industries.

The delegation will visit Japan and South Korea, besides Singapore in the second phase of its tour.

According to the report of the delegation, it was successful in persuading the main producers in Western Europe, the US and Brazil to earmark 57,000 tonnes of polymers during the last quarter of 1988, and 2,58,000 tonnes for 1989, for the Indian market. In addition, some large trading companies have offered certain quantities for 1988 and 1989.

Moreover, Chemtex Inc, New York, indicated that it would make an offer within two to three weeks. Mitsui and Co, (USA) Inc, gave an offer for immediate sale of about 500 tonnes of LDPE, 1,900 tonnes of HDPE and 4,000 tonnes of PP, but the prices were higher by about \$ 200-300 compared to the ruling prices.

Almost all the suppliers that the delegation met, emphasised that the supply position was tight for all polymers till the end of 1990, except for PP, which should be somewhat more freely available towards the end of 1989.

Because of the negative return on the polymers production during 1980-85, no new investment except for PPC, was made during 1981-87. However, during the same period, the processors made handsome profits due to low resin prices, and utilised their surplus in substantial investment in new processing equipment. This had led to a demand growth during 1986 and 1987. In Europe, the demand growth was 9-11 per cent for polymers against the projected demand growth of one-three per cent. In the US, demand grew on an average eight-10 per cent against the anticipated growth of one-three per cent.

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Also, China has emerged as a large importer of polymers, mopping up large quantities of the exportable surplus at lucrative prices. In 1987, it was estimated that China contracted for imports of 3,72,000 tonnes of LDPE, 1,50,000 tonnes of HDPE, and 7,50,000 tonnes of PP. However, China, in turn, is exporting large quantities of plastic bags.

Because of the shrinkage of the exportable surplus, none of the producers in Europe and the US are interested in supplying the material on a short-term basis. Some of the producers showed interest in considering India as a market for their products, and were willing to divert part of their supplies to India provided a long-term relationship could be established. The delegation explained that this could be done with the STC and the IPCL as well as with some large processors in India, IPCL would be importing HDPE/LDPE and PP and distributing these to a large number of small processing units, who were unable to import directly. Similarly, the STC would import HDPE and PVC which it could distribute through PIL and NOCIL.

Since none of the producers contacted are prepared to respond to open tenders, but are willing to negotiate prices on bilateral basis, the delegation has suggested that the parties who have agreed to earmark material for the Indian market should be asked to quote separately. This could be done about 30 days before the start of a quarter, and enquiries floated separately to three-five parties.

After knowing the trend of prices, these could then be negotiated and orders placed for supplies in the quarter provided the prices could be agreed with the suppliers. The procedure would be essentially in the nature of "limited invitation to bid".

The delegation has also recommended that the import duty structure should be rationalised in view of the current high prices of polymers. Prices should be periodically monitored and duties changed, if

necessary, to keep the landed prices close to the indigenous prices.

The tight supply position is likely to continue for long and the prices will remain firm and can even go up further, the delegation observed. Since export prices are no longer based on marginal costs, but are 20-30 per cent higher than their domestic prices, it is necessary for India to build its own capacities as fast as possible so as to reduce dependence on imports, it has suggested.

Iodised salt units not taken up

The proposal to set up two units in the industrial co-operative sector for the manufacture of iodised salt at Ennore near Madras and at Vedaranyam in Tanjore district has not materialised so far due to lack of demand for the product in the southern region according to Mr. C.N. Balakrishnan, joint director of Tamilnadu industries and commerce department (chemical).

Mr. Balakrishnan said that already four units in the private sector are manufacturing iodised salt at Tuticorin in Chidambaranar district.

Private sector units are already exporting their products to the north eastern India and the state government would help them to further boost their exports to other areas if possible. If the state government is to start the proposed two units, they would have to explore the export markets and have to pay more by way of freight charges which will put the units in a disadvantageous position in the initial stages.

The state government approached the Union railway ministry for permission to send their products at concessional freight rates but there was no response from them. In view of this the state government has not taken steps to set up the two units in the cooperative sector, he said.

A total of fifteen lakh tonnes of ordinary salt was produced during 1986 from the 35000 acres of land along the coastline of the state. The production went up to 71 lakh tonnes during 1987 and the production was expected to be of the order of 22 lakh tonnes by the end of the Seventh Plan. Tamilnadu stood second in salt production first being Gujarat.

The four private sector units together produce nearly 30,000 to 35,000 tonnes of iodised salt per year. The country's requirement of iodised salt by 1989-90 is expected to be ten lakh tonnes. Gujarat produces about 3 to 3.5 lakh tonnes, he said.

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MINERAL BENEFICIATION PROJECTS

Export development fund suggested

The need to set up a mineral export development fund for financing beneficiation projects and to provide subsidy to the ore suppliers has been emphasised by a study on the role of Minerals and Metals Trading Corporation (MMTC) in the promotion of exports of Andhra Pradesh, Madhya Pradesh and Orissa.

The study has also underlined the need to create a small and medium enterprises (SMES) export promotion fund of Rs. 15 crores. The fund could be utilised for improving product design; presentation and development, identifying target markets and buyers, financing export operations and preparing catalogues.

Conducted by the Centre for Studies on Technology and Trade, the study suggests that the mineral export development fund could be started with an initial capital of Rs. 50 crores for undertaking a host of activities.

These include financing beneficiation projects of MMTC and select state corporations. Likewise, it suggests that the fund could be used for providing subsidy to more suppliers or MMTC to cover the difference between the procurement prices based on actual cost and export earnings.

Where the difference is positive and export earnings exceed the cost of supply, a percentage of export

profits could be collected to replenish the fund, the study suggests.

It is further suggested that the fund may be placed at the disposal of MMTC which can operate it strictly on the guidelines prescribed by the ministry of commerce. It could finance projects and related activities approved by the ministry.

Conducted at the instance of MMTC, the study feels that the Corporation should be groomed to become an international trading house on the lines of those active in Japan. This could be done by changing from the mechanism of canalisation to "dynamics of international trading." As a preliminary step, investment in resource development, product diversification, export marketing and monitoring the operations "thereof is deemed crucial."

The MMTC, the study says should be groomed to become an important multi-product, multi-market, multi-service and multi-national trader in the currently evolving global system of supply, production, marketing and technology transfer.

According to the study, prospects of boosting non-canalised exports are bright, as much as Rs. 100 crores, by 1991, with increasing foreign exchange earnings in the succeeding years. The study focuses on export promotion of some minor minerals

and import substitution activities especially in case of tungsten.

As per its export thrust package, the study has picked up the following minor mineral and products: bauxite, barytes, graphite, granite; brackishwater prawn; agro products; engineering goods and chemicals and pharmaceuticals. For bauxite, it suggests that MMTC could take up marketing of surplus alumina from Nalco (Orissa).

It is further suggested that MMTC can assist in the creation of new bauxite refineries in Andhra Pradesh for export purposes. The markets include Eastern and Western Europe.

For barytes, the study suggests the formation of a co-operative of small producers for systematic mining, sustained production and marketing. The markets abroad include the West Asian and Japan. For graphite it is suggested that a subsidiary may be floated for import substitution and export promotion. The Andhra Pradesh Mineral Development Corporation could be requested to acquire leases of tungsten bearing graphite areas and join MMTC prompted subsidiary as a partner.

For brackishwater prawns, the need for MMTC to set up a subsidiary at Puri in collaboration with the Orissa government, has been emphasised. Investment in processing, cold storage, refrigerated transportation, it is pointed out, is essential.

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Filling ozone hole

The ozone layer over the earth protects the planet from ultraviolet radiation. The subject of ozone depletion is often discussed of late in the media and elsewhere. The mysterious thinning of ozone layer over the Arctic and Antarctic regions have led to a lot of speculations about the early decay of the ozone shield. This causes concern about a likely increase of the incidence of skin cancer as well as the destruction of eco and bio-systems.

The value of ozone content in the atmosphere has never been stable. Throughout the late forties and the first half of the fifties, it has been growing. The sixties showed a drop but in the next ten years, it began to grow once again reaching the level of the fifties. Since the second half of the seventies, ozone has been steadily depleting. By now, it has grown thinner by three per cent, according to scientists.

The content of ozone in the atmosphere depends upon several inter-related factors like the change in the dynamics of the atmosphere or the contents of the ozone-destructive elements. The principal ozone "killers" are halogen-bearing substances (substances containing fluorine, chlorine, bromine, iodine) and other elements including freons. It is estimated that, given the present day rate of freon emission, the layer of ozone shield will grow

thinner by 6 to 7 per cent by the middle of the next century.

Thinning of ozone layer is of grave consequence to man and life around. According to the United Nations Environmental Programme and the WHO, conventional clothing provides enough protection against ultraviolet radiation, but there is no readily available protection for either animals and plants. Tentative research findings show that the yield of certain crops might drop by at least 30 per cent. Environmental changes will also affect micro-organisms like plankton which is the basic food for sea creatures.

A rise in the ultraviolet radiation is found to result in a higher rate of smog recurrence in industrial centres. Experts say it is unlikely to happen earlier than half a century from now and only if no measures for environmental control were taken. They rule out any adverse happening since there is a large scale programme for ozone protection to be implemented in the near future.

So far, science has no proper explanation of ozone holes. In the seventies, scientists became interested in the mechanism of interaction between ozone and its "killers" for the first time. Forecasts were even more pessimistic. It was thought that by the end of the cen-

tury, the ozone layer would grow 27 per cent thinner. Fortunately, it proved wrong.

Ozone hole :

As for the origin of the ozone hole, there are several hypotheses which trace it to either chemical or dynamic processes in the upper atmosphere or a combination of the two. Some scientists link ozone holes to temperature fluctuations in the upper atmosphere and solar activity. These too have no convincing evidence.

Research in this field has been conducted by many countries on individual and collective basis. However, it has yet to find efficient methods to assess changes in the ozone layer under the impact of natural factors, study their role in the climate and biosphere, and produce ecologically neutral technologies and substances.

The current thinning of the ozone layer is largely attributed to freons, methane, nitrogen oxides and about 27 other agents emitted into the atmosphere. It is held that ultraviolet radiation not only destroys ozone but also promotes its build up. However, the comparison of both the processes incline heavily in favour of destruction.

Hence, it is feared that unless emission into the atmosphere are curbed, the ozone content would be cut down to 6 to 7 per cent in the next century. This makes a strong

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case for phasing out freons from the economy and replacing it with harmless agents.

The rate of freon production is evaluated at about a million tonnes a year. They are widely used as aerosol propellents, cooling agents, and foaming agents. For a long time, their harmful properties were shrouded by the attractive possibilities they offered. Besides, they were not toxic or inflammable and did not bring off any chemical reactions in the lower atmosphere.

Ozone "killers":

And it was only in the seventies that scientists first became suspicious of the likely destructive effects of freons. Industrialised western countries have produced 10 to 15 times more ozone "killers" than all the other countries in the world put together. The US accounts for 40 per cent of the world output of freons, the EEC 35 per cent and Japan and the USSR, 10 per cent each. It is understood that the US and the USSR have already developed effective substitutes for freons.

The increasing awareness of ozone depletion has already brought into focus concerted international efforts for obviating any future global hazards. The first convention of ozone protection was adopted in Vienna in 1985. It promoted an intense effort for study and control

of the situation. Experience gained in the process paved the way for the Montreal Agreement on freezing consumption and production of freons and other substances harmful to ozone. It was signed by 50 countries.

It is expected that by 1993 freon production would be cut by 20 per cent and it will go by another 50 per cent by 1998. This programme if completed would reduce ozone depletion to the minimum provided there is no production of any other harmful chemical agents. The agreement also provides to take care of any critical situations, later developing, with emergency measures.

It also warns that modernisation has to be gradual after substantial preparatory efforts, so as to stem adverse economic and social impact. The Montreal agreement also outlaws the transfer of freons, the knowhow and equipment for their production to countries who have abstained to sign the agreement and prescribes drastic sanctions for the violation of its basic principles.

OZONE DEPLETION OVER THE ARCTIC TOO

The ozone layer is thinning in the northern as well as the southern hemisphere, according to a new and exhaustive analysis of data.

The results of the study recently announced in Washington confound existing models that predict very minor falls in ozone in the stratosphere from the action of trace amounts of artificial gases. The most notable ones are chlorofluorocarbons (CFCs), used in some aerosol sprays, in refrigerators and in some foam packaging.

The layer is thinning most in winter and at high latitudes, bringing fears that the same processes that have created an ozone "hole" over Antarctica in the past decade may also be at work over the Arctic.

The new study shows small reduction in ozone levels of about two per cent in temperate latitudes in summer, but a larger reduction in the ozone layer in winter of around six per cent since 1969 at latitudes between 53°N and 64°N. The reduction between 40°N and 52°N (which includes virtually all of Europe and the northeastern states of the U.S.) is around 4.7 per cent.

Researchers believe that the ozone hole is so pronounced over the Antarctic because ice crystals form in the tight polar vortex of air that swirls over the continent in the southern winter. This allows a series of heterogeneous chemical reactions to occur on the surface of the crystals.

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Semi-processed leather exports allowed

The Centre has allowed export of semi-processed leather during the period April 1988 to September 1988. A ceiling of 29,69,000 pieces has been imposed on such exports.

According to a public notice, issued by the Commerce Ministry, the ceiling of 29,69,000 pieces will consist of 19,48,750 pieces of semi-finished E.I. tanned (inclusive of buff calf 2,44,500, cow calf 2,08,750, cow hide 2,21,250, buff hide 13,750, sheep skin 5,63,000 and goat skin 6,97,500) and 10,20,250 pieces of wet blue goat skins.

The Government has also relaxed the procedures for exports of these semi-finished leather. It has now been decided that the export ceiling will be monitored by the Joint Chief Controller of Imports and Exports (JCCI and E), Madras in respect of E.I. tanned (buff calf, cow calf, cow hide, buff hide, sheep skin and goat skin) and by JCCI and E, Calcutta in respect of wet blue goat skin.

Intending exporters may submit their applications separately for each item to these licensing authorities i.e., the JCCI and E concerned in a sealed cover superscribed "Application for ceiling of leather item," within 30 days from the date of issue of the public notice (i.e. June 22, 1988).

The licensing authorities will consider the applications on the basis of the highest unit value sought to be realised and as quoted in the application by the exporters, as per

the provisions laid down in the export policy. The unit of measure shall be on the basis of a lot of 100 pieces of irregular sizes to be quoted in Indian rupees f.o.b. (for 100 pieces).

No applicant shall ordinarily be granted export licence for more than 10 per cent of the available ceiling in each category. In case, the ceiling remains unutilised the procedure for calling for more applications will be repeated as laid down in the export policy. The licensing authorities will intimate to the exporter the allotted export quota and the exporter will be given 10 days' time from the date of issue of the ceiling to furnish bank guarantee as prescribed in the policy.

The bank guarantee shall be one per cent of the f.o.b. value of the ceiling allotted. On the exporter furnishing the requisite bank guarantee, the licensing authority shall issue an export licence for the ceiling allotted and indicate in the export licence the f.o.b. value at which the exporter had agreed to export and as furnished in the application. The export licence shall have a validity of six months, according to the public notice.

WORK APACE AT NFCL

The engineering works at the Rs. 635-crore, five lakh tonnes per annum urea plant of the Nagarjuna Fertilisers and Chemicals Ltd. (NFCL) commenced from May 4

with a commitment to complete the project by April 1991.

With the kick-off session of experts from the technology collaborators Snam Progetti, Projects and Development India Ltd. (PDIL) and Development Consultants Private Ltd. works are taken on a war-footing. A team of 300 personnel from all disciplines are working at the Kakinda site in close co-ordination with the consultants.

Addressing newsmen at Hyderabad on June 26, Mr. K.V.K. Raju, Managing Director of NFCL, stated that the project has received all the necessary clearances. In fact, the co. was first to fall in line with the new policy of global tendering for import of its machineries, Mr. Raju said.

Term loans for the project amount to Rs. 508 crores and total equity to Rs. 127 crores. The following is the breakup of the equity stake in the company: Nagarjuna Promoters and Associates Rs. 21 crores, Snam Progetti Rs. 13 crores, Andhra Pradesh Government Rs. 15.50 crores, Nagarjuna Finance Rs. 5 crores, reserved for farmers and dealers Rs. 10 crores and Shaw Wallace Rs. 0.67 crore.

While the promoters' contribution thus amounts to Rs. 65.17 crore, out of the proposed Rs. 62-crore public subscription, Rs. 10 crores will come from the Commonwealth Development Council and the balance from the general public. It is understood that almost all the public equity has been assured to be underwritten by the institutions as well as commercial banks.

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Centre grants Rs. 12 crores

The Union government has released funds to the tune of Rs. 12 crores to fuel India's endeavour in the rapidly developing hi-tech realm of superconductivity.

Various facilities across the country have received the grants. The funds would help to improve the infrastructure to carry out competitive research and to develop capabilities in the technology applications area.

Indian Institutes of Technology (IIT), Tata Institute of Fundamental Research, Indira Gandhi Centre for Atomic Research, Indian Institute of Science (IISc) and Bhabha Atomic Research Centre (BARC) are among the organisations that will participate in these efforts.

The funds follow recommendations in the form of priority programmes drawn up by the national superconductivity programme management board led by Prof. C.N.R. Rao, who also heads the science advisory council to the Prime Minister (SAC-PM). The programmes were approved by the apex body chaired by Mr. Rajiv Gandhi.

Spelling out the details of these programmes in an interview to UNI at Bangalore Prof Rao said some centres would exclusively work on making thin films, wires or tapes, while a few others would concentrate on synthesis of new materials and their characterisation. Some others would make prototype devices.

Prof. Rao said "we are going to give fellowships to young people interested in superconductivity research. We are sending a lot of young people abroad to participate in conferences in the area."

On research, he said "people are now looking for newer materials. One of the things is to look for materials without copper. Some have been found but they are not very good. I am also interested in that." The team he leads at the IISc has received Rs. 90 lakhs for basic research in this sphere.

He said scientists were trying out compounds of bismuth and thallium. "In our lab, we have got upto 125 k (minus 148 degrees celsius) without any problem. We are now hoping to make one at 140 k (minus 133 degrees celsius)."

In research, the country was doing fair amount of work he said. However, in technology applications, "we have just started some work on making films. We never did all this before. We should have done it. Suddenly people are caught un-awares."

He said at the IISc, his team had discovered superconductivity in some systems between 200 K and 280 K (minus 73 degree to seven degrees celsius). These were stable and reproducible but were not pure compounds. "We have to isolate (the compounds) and find conditions to make them," he added.

The team also discovered an unusual property of superconducting

DEVICE GRADE SILICON

Hemlock data for upgradation mooted

The Electronic Commission Chairman, Mr. P.S. Deodhar, has said that the scientific community should have "grabbed" the opportunity to use the data acquired at a huge cost from the Hemlock Semiconductors of the US for upgrading the process of making device grade silicon in the country.

Talking to press said the country had paid \$ 4.89 million for the Hemlock process package, basic engineering design, engineering details on critical equipment and standard operating procedures. Besides the Government had spent Rs. 2.11 crores on related works within the country.

He said not many countries have more than one process to produce polysilicon and the country should utilise the vast data it has got from the Hemlock Company and improve upon it for making polysilicon of high purity.

The contract with the US company was abrogated after a two-year controversy over favouring foreign technology while it was available within the country.

Mr. Deodhar said scientists at the private sector Metkem Silicon in Mettur, Tamil Nadu the country's only silicon producer, have not been successful in developing electronic device grade silicon. Their entire production is routed through the Department of Non-conventional Ener-

systems. These substances were found to absorb electro-magnetic waves, opening new avenues to more applications in different spheres, including defence.

He did not agree with media reports that the initial euphoria and enthusiasm about superconductivity research had abated. Efforts were on "like mad" all over the world. "People do not go to the newspapers everyday. Actually people have become more mature and do not behave the same way," he added.

He felt that current density or the current carrying capacity of superconducting systems and not their brittleness was the "real problem" confronting scientists. High, very good and stable current density had remained elusive. "I think even brittleness can be beaten," he said.

gy Sources (DNES) for making photovoltaic panels.

Though the requirement for device grade silicon is not big, it is growing, he added.

He favoured utilisation of the infrastructure at the national silicon facility for setting up a pilot plant with the upgraded Hemlock process.

This would enable the Metkem Silicon R and D unit to improve the quality and bring down the cost to international level.

Besides, the Metkem technology, developed by the Indian Institute of Science another process to make polysilicon has been developed by a team of scientists at the National Chemical Laboratory (NCL), Pune. The process adopted fluidised bed with trichlorosilane as feedstock and is said to be far superior compared to other processes already commercialised.

However, the team has not been successful in starting a commercial plant due to inordinate delay by the Department of Electronics in considering a proposal to import a second hand plant for a hundred per cent export-oriented unit. In the meantime, China bagged the plant which was subsequently rejected by the department, according to NCL sources. A fresh application is now before the department for a smaller unit and an industrialist in Pune is willing to take up the project, the sources said.

Oil slicks threaten marine life

Oil slicks from tanker-ships are polluting the Indian Ocean, threatening the marine life on the surface.

The problem may not appear to be as serious as in the north sea but intense occurrence of oil slicks have been sighted in the northern Indian Ocean, scientists say.

The source of these oil slicks is mostly the washing of the bilge and bunker of tankers on their way to the Gulf ports when the tankers' contents are emptied into the sea.

According to the scientists at the National Institute of Oceanography (NIO) two of the world's major oil tanker routes pass through the Indian Ocean, transporting 80 per cent of the Gulf's oil output, causing the ocean's pollution.

One tanker route starts from the Gulf ports, goes via the Mozambique channel, round the Cape of Good Hope to the western hemisphere.

Another route also originates from the Gulf, passes along India's economic exclusive zone, round the Sri Lankan coast, across the southern bay of Bengal through the Malacca Straits to the Far East and Japan.

NIO scientists studied the tanker routes and made more than 6,000 observations from research ships to prepare a computer mapping of the oil pollution.

"The intensities of oil slick sightings are the highest along the two tanker routes", says Mr. S.P. Fondekar who along with fellow scientist R. Sen Gupta, carried out the study.

"Tanker disasters are rare on these routes and we think the source of these oil slicks is mostly the bilge washing of tankers on their way to the Gulf ports", says Mr. Fondekar.

The tankers discharge into the sea oil left in their hold and use the sea water for cleaning in violation of the maritime and environment laws.

Under shipping laws, cleaning and washing of tankers should be done only at ports of call.

"But few vessels follow the laws which can hardly be enforced at mid sea, on the international waters", he says.

The study by NIO scientists showed that areas away from the tanker routes little or no residue of oil slicks or floating petroleum.

Oil discharged into the sea from tankers undergoes changes with the evaporation of its lighter fractions.

Parts of the oil get dissolved in sea water and the rest is transformed to tar lumps that either sink to the bottom or are washed ashore on the beaches.

About 8,400 tonnes of these tar residues are produced annually by oil slicks in the Arabian Sea. In the southern Bay of Bengal, it ranges at 1,100 tonnes a year.

Similarly, more than three million tonnes of dissolved petroleum hydrocarbons are expected to be present in the upper 20 metres of the Arabian Sea at any given time.

In the southern Bay of Bengal, the presence of these carbons is estimated at about 400,000 tonnes.

Two years' conservation on the beaches of Kutch to Kerala along the west coast indicate deposition of 750 to 1,000 tonnes of tar like residues, mostly during the south west monsoon.

"These data have been updated and computerised to indicate the oil pollution", Mr. Fondekar says.

"Our study clearly shows that the

oil tanker routes across the northern Indian Ocean are as much polluted as the shipping lines of other oceans", Mr. Fondekar says.

Our conclusion drawn by NIO scientists is that the Indian west coast remains "vulnerably" exposed to oil spills and slicks during the south-west monsoon, that is between May and September.

Movement of oil slicks are regulated by movements of water on the sea surface.

"If the speed and direction of surface currents over a long period of time is known, a forecast of such movements can be made", Mr. Fondekar says.

The quantity of oil polluting the ocean is proportional to the volume transported by tankers on the routes.

NIO scientists computed that the entry of tar into the Arabian Sea was 32,800 tonnes and 11,700 tonnes in the Bay of Bengal between 1973 and 1983.

They also found that the tar occurring on the Indian seas remained more or less unchanged for 30 to 90 days.

Converting plastic into crude oil

The Germans have achieved something unbelievable — converting discarded plastic into crude oil, the organic material it once was.

As a versatile packing material, plastic has substituted scarce materials like metal, wood and rubber. But the chink in its lightweight armour is its inability to decompose.

Discarded plastic material has become such a nuisance that some European countries have laws restricting their use. Supermarkets in some European countries have laws restricting their use. Supermarkets in some European countries charge extra for a plastic bag to discourage its use.

Inability of plastics to decompose (burning it pollutes the air) has led to considerable research in developing bio-degradable plastics. The results have not been satisfactory as these lack the plus points which have made plastics such a popular material.

Now, researchers at Union Kraftstoff, a West German chemical firm, has developed a hydrogenation process whereby plastic and other wastes are treated under high pressure and temperature and the plastic

molecules are broken down and hydrogenated.

The product is superior to crude oil and could be used as gasoline or heating oil. Kraftstoff intends to put up a pilot plant to convert 400 tonnes of oil. The company has patented its process.

In India, lot of discarded plastic articles are recycled, though there are no authentic details as to how much. Indian Petrochemicals Corporation Ltd., (IPCL) is said to have conducted a study on the subject but no details are available. Recycled plastics are inferior and goes into the making of shoes. Abroad, a wide range of materials, including pipes, are made from recycled plastics.

The Government is keen to encourage recycling plastics as it is a scarce resource for which the country is heavily dependent on imports. It will also take care of the pollution problem. Industry observers feel that there is higher value in converting wastes into polymer rather than oil. Nevertheless, they are keeping a close watch on the progress of the German technological breakthrough with interest.

Oil front disappointing

The country is slipping on the oil front, with domestic crude production stagnant at about 30 million tonnes annually and dependence on imports increasing.

On the basis of production trends in the first three years of the Seventh Plan, crude oil production is expected to fall short of the target by three million tonnes in the terminal year of the plan. The annual plan production target is 34.53 million tonnes by 1989-90.

The gap between demand and supply is widening. The country's self-reliance in oil has fallen from 72 per cent at the beginning of the Seventh Plan to less than 60 per cent in the current financial year.

Despite rising oil imports and a burgeoning bill, no serious attempt is being made to increase indigenous production of oil or to conserve its use, according to oil industry sources.

The actual production of crude oil in the past two years has been short of the annual target envisaged in the Seventh Plan document. The actual production of crude oil in 1986-87 was 30.50 million tonnes, against the plan target of 31.08 million tonnes. Similarly, the actual production in 1987-88 was only 30.36 million tonnes, compared to the target of 31.48 million tonnes.

However, in the current financial year, the Government has set an ambitious target of 32.18 million tonnes, against the original plan target of 31.91 million tonnes.

To achieve the plan target of 34.53 million tonnes a year by 1989-90, crude production will have to be stepped up by four million tonnes. However, neither the Petroleum Ministry nor the Oil and Natural Gas Commission (ONGC) has so far identified the areas from where the additional amount could be produced in the next two years to achieve the target.

Although ONGC has been claiming exciting new oil finds in the West and South, these are expected to contribute less than half a million tonnes of oil by the terminal year of the plan.

Intensification of production from the Bombay Basin, including Gandhar, and new finds in the Bombay High, Krishna-Godavari and Cau-

million-tonne increase in output by the middle of the Eighth Plan.

Exploratory drilling by both ONGC and Oil India Limited (OIL) has been consistently short of plan targets. The targets were not met, partly because of delays in both supply of indigenous rigs by Bharat Heavy Electricals Ltd., and in finalising orders for mobile and charter hire rigs.

India's proven and balance recoverable reserves of crude oil, both onshore and offshore, were only 520 million tonnes at the end of 1987. They included 320 million tonnes in the Bombay High and about 100 million tonnes each in Assam, Nagaland and Gujarat. Even at the current level of production, the country's oil reserves may last only for another 16 years.

The ratio of proven and balance recoverable reserves to production has been declining alarmingly since 1980. The ratio of balance recoverable reserves to production was 39 in 1980. This ratio came down to 15 at the end of 1987.

Recoverable reserves of oil constitute only about 25 per cent of the in-place geological reserves. In the case of ONGC, the figure was around 20 per cent between 1976 and 1983, 22 per cent between 1983 and 1985 and 24 per cent in 1985-86.

Oil production from the Bombay High, which now accounts for about 70 per cent of the country's total production has been progressively declining for the past two years. The Bombay High reached a peak production of 20.82 million tonnes in 1985-86. Production declined to 20.62 million tonnes in 1986-87 and to 19.92 million tonnes in 1987-88.

TOXIC WASTES THREATEN NIGERIAN CITY

The Nigerian population living within a 15 km radius of the port city of Koko, threatened by radioactive and chemical contamination, is being evacuated by a special government group, Tass reports from Lagos.

Four thousand tonnes of toxic industrial wastes delivered by an Italian firm last September on faked papers were buried near Koa. They will, it is feared, infiltrate the soil and mix with subterranean waters

and do irreparable damage to the delta of the Niger river on which the city lies.

Foreign decontamination experts are to arrive in the next few days at the area of the death-dealing dump following an appeal for help by friendly states and international organisations sent out by Nigeria which has no decontamination expertise.

A Nigerian protest note demands that the Italian Government remove the toxic wastes from the Nigerian territory as soon as possible.

Zimbabwe as co-ordinator of the non-aligned movement (NAM) has asked the West to immediately put an end to the practice of their trans-nationals and others using Africa as the dump for toxic wastes which are posing a serious threat to the ecological situation and life of millions of people on the continent, according to a foreign ministry statement in Harare quoted by Tass.

The Congoese newspaper, "Etumba" in Brazzaville has reported that shipping of harmful wastes to developing countries has become a lucrative business for monopolists of industrially developed countries whose legislation and environmentalists do not permit their dumping anywhere in Western Europe or America.

Whereas it costs them about two thousand dollars to process a tonne of wastes on the spot, Western corporations offer two to four dollars for dumping each tonne of waste in the territories of some developing countries which face economic difficulties of their own, according to "Etumba", as quoted by Tass.

Fictitious industrial processing firms run by corrupt elements have managed to bring thousands of tonnes of hazardous substances to a number of developing countries, the newspaper has found.

"Etumba" advises governments of African countries to combat this serious evil with special legislation and asks African newspapers to be vigilant against violation of environment protection laws.

Urging the Organisation of African Unity (OAU) to establish a co-operative effort to combat the problem, the newspaper says the African public should intensify the struggle against converting their continent into the wasteland of the West.

Greater role for co-ops

The Oil and Natural Gas Commission (ONGC) is gradually concentrating on core areas, leaving low-technology part of its activities to co-operatives formed by its former employees

Since the launching of this scheme in 1985, the co-operative movement in ONGC has shown a 300-fold increase. Today, there are 20 co-operative societies with 559 members. This includes five co-operatives formed with ONGC employees. Another 20 societies with 448 members have been cleared for registration, which include four societies involving 102 ONGC employees.

This new direction in the Commission was set in March 1985 when its executive committee decided to farm out low-technology areas to co-operatives and ancillary units. ONGC being a high-technology organisation, it was felt that only core activities in exploration, drilling and production should be taken up by the Commission. This decision was in response to the challenges posed by enormous expansion envisaged in ONGC in the next two decades. For example, the expected financial outlay for the Tenth Plan is four times that of the Sixth Plan outlay. Naturally, such an increase would be reflected in the corresponding rise in all activities.

This new approach enables ONGC to avail itself of the services of other agencies for employee activities requiring large manpower. Areas like shot-hole drilling, mud services, workover rig operations, transportation, topographic surveying, estate maintenance and house-keeping, guest house services and logistic support by OSVS have been identified for this venture.

Many ONGC employees have successfully launched themselves as entrepreneurs. The formulations of guidelines for the development of these cooperatives and formation of ancillary development cell has further encouraged participation in the scheme.

The co-operative movement has much wider implications. The shot-hole drilling co-operatives of western region which were the very first ventures in this movement, have shown their excellence by considerably enhancing their productivity. Contract labour, ex-employees and even groups of innovative youth are welcome in this co-operative movement.

The movement also offers tremendous scope for entrepreneurs in States like Assam and Tripura. These States which have rich gas potential, can benefit from gas-based industrial units. Towards this role, ONGC is interacting with State Governments for developing industrial estates that would give fruitful employment and contribute to the development of these regions.

For entrepreneurial development, special training courses have been organised by ONGC. In the eastern region alone, 60 entrepreneurs have been trained. The Commission has experienced several-fold increase in productivity in specific areas of operations. In seismic operations alone, there has been an average increase of productivity of the order of 56 per cent in 1987-88 as compared to the previous year. A good measure of this, ONGC sources say, could be attributed to the concept of co-operatives.

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Govt. identifies 27 companies

The Union government has identified 27 companies, most of them with foreign collaborations, who will be eligible to bid for ONGC's tenders for rig charter-hire. Almost all these companies belong to big industrial houses, in the country.

Among the companies identified, Tata's Hi-Tech Drilling has a collaboration with Forex Fortune of the US, Birla International with Eason Oil Company, also of USA, Modi Industries with another US company Santa Fe International Corporation and Jindal Drilling with Diamond Oil Company, USA. Similarly, Great Eastern Shipping Company has a tie-up with Atwood, USA, Triveni Engineering with Pool Company, USA, Shaw Wallace with Blocker Energy Corporation, USA, Mahindras with Soresal of France and Chowgules with Sondeous Petroliserous, Spain.

Among other joint venture companies which have received government approval are Aban Lloyd, Nav Bharat Parker Drilling, Hind Protexa, Afoon Zopata and Indo-Can Exploration.

Essar is the only Indian group which has not floated any joint venture company with foreign collaboration to offer rigs to ONGC on charter-hire. Essar makes outright purchases from abroad.

The governmental approval to these companies is a part of ONGC's plan to discontinue, gradually, the present system of chartering rigs, both onshore and offshore, from foreign firms. Instead, ONGC would like to route chartering of all foreign rigs through Indian parties.

The rationale behind this policy shift is to encourage the development of Indian expertise in drilling so that in course of time, Indian experts can undertake similar jobs in other countries. A beginning has already been made with ONGC signing an agreement with Vietnam for taking up exploration in that country. Discussions for a similar agreement are underway with Tanzania.

The other advantage of the new arrangement is that it will help ONGC make payments in rupees rather than in foreign currencies, thereby helping the country conserve precious foreign exchange.

At present, ONGC has a total of

118 rigs deployed all over the country. Ninety-three of them are deployed on shore and 25 off shore. Eighty-four onshore rigs are owned and operated by ONGC itself, the balance nine being on charter-hire, including six from foreign firms and three from Essar.

ONGC has deployed 37 onshore rigs in the north-east region including five in Cachar. There are three

ONGC may set up gas-based units in Tripura

The Oil and Natural Gas Commission (ONGC) is exploring the possibility of assisting the Tripura government in setting up units for utilisation of the abundant gas in the state.

According to information available the commission is toying with the idea of providing financial assistance to entrepreneurs willing to set up units based on natural gas. The commission would naturally have to get the Centre's okay should things take concrete shape.

To begin with, it is felt that there is a strong case for setting up gas-based power projects in the state. The power sector has been identified as the chief user. In fact, the Tripura State Electricity Department (TSED) is already utilising gas supplied by ONGC. The current rate of supply to the TSED from the Barāmura structure is about 1.3 lakh cubic metres a day.

A proposal to set up a 100 tpd. fertiliser plant with a gas consumption of one million cubic metres a day is, meanwhile, being examined by the state government. Similarly, the possibilities of setting up a 200 tpd methanol plant, based on natural gas, are being considered. Methanol, besides serving as a fuel, finds extensive use as raw material for chemical industries.

Initial studies by the commission reveal that the total gas consumption potential in Tripura is around 4.4 million cubic metres a day. Of this, 1.24 million cubic metres per day is expected to be used as fuel. The rest is envisaged as feedstock for the fertilisers, methanol and other industries.

Meanwhile, a memorandum of understanding has been signed between the commission, the Tripura

onshore rigs operating in West Bengal, seven in Tripura and one in Bihar.

Of the total number of 25 offshore rigs, nine are owned and operated by ONGC itself, seven by Indian joint-venture firms — Great Atwood and Aban Lloyd, offering two each, and Essar, Mahindras and Hi-Tech Drilling, one each. Nine other offshore rigs have been supplied by foreign firms on charter-hire. One offshore Japanese rig is currently deployed in the Bay of Bengal.

Industrial Development Corporation (TIDC) and the Bombay Gas Company for distribution of natural gas in Agartala.

Interestingly, there is a proposal for converting coal-based brick kilns to gas. The brick kilns around Jirania, about 20 km west of Agartala, are all coal based. The utilisation of gas would help in reducing the dependency on coal, uncertainty about its supply as also the related problems like transportation delay.

Similarly, a five-tonne-per-day cement plant has been envisaged after indications of limestone deposits were available in Tripura. The coal consumption is anticipated at four tonnes per day. This could easily be substituted by gas, it is learnt.

ONGC SEEKS INCREASE IN CRUDE PRICE

Oil and Natural Gas Commission (ONGC) has urged the Centre to enhance the price of its crude in view of the steep rise in production cost.

According to ONGC sources, the present price of crude was fixed before 1981 at Rs. 960 per tonne as compared to Rs. 1,100 elsewhere. But now, the sources said, while the price of crude had gone up to Rs. 1,800 per tonne everywhere because of the high cost of production, the price for ONGC crude still remains at Rs. 960 a tonne.

The sources said in spite of that, the Commission emerged as the highest profit-making concern in the country during the past two years. While in 1986-87 it had made a post-tax profit of Rs. 1,485 crores, in 1987-88 it had gone up to Rs. 1,505 crores mainly because of the "induction of low cost innovative production technology".

Saleempur aromatic project to be in private sector

In a departure from its policy of establishing the new petrochemical complexes in the joint sector, the Union Government has decided that the much-talked about aromatic project at Saleempur in Aligarh district of Uttar Pradesh will be set up in the private sector.

Applications from several large companies have been received by the Department of Chemicals and Petrochemicals. They will be scrutinised and referred to the Projects Approval Board in the Industry Ministry.

There were three contenders for the Saleempur complex, when the letter of intent (LI) was issued to Pradeshia Industrial and Investment Corporation of Uttar Pradesh (PICUP) to be set up in the joint sector.

These were Reliance Industries Ltd., Birla group of Mr. Aditya Birla and the JK Group. It is not yet known whether these three parties will once again bid for the complex, or how that it is to be set up in the private sector.

This complex has been planned to produce benzene, o-xylene and p-xylene, purified terephthalic acid, based on naphtha, to be obtained from the nearby Mathura Refinery. The cost of the project would be about Rs. 1,500 crores.

The Government had taken a decision at the beginning of the Seventh Plan that all new petrochemical complexes in the country would be set up in the joint sector in view of the size and huge financial liability of these projects. It was felt that either a State Government agency or a public sector company should join hands with a private sector company to set up these projects.

Accordingly, the two aromatic complexes proposed for Saleempur and Madras and three olefinic complexes for Mangalore, Gujarat and Visakhapatnam were to be set up in the joint sector. Even the Haldia petrochemical complex was converted into a joint sector project with the R.P. Goenka Enterprises and the West Bengal Industries Development Corporation as the co-part-

ner. LI for the Saleempur project, the first of the petrochemical complexes proposed for the Seventh Plan, was issued to PICUP on March 3, 1986 with a validity of one year.

But during the one-year period PICUP could not select any private sector partner to be the co-promoter for the aromatics project. Its only achievement was the setting up of a screening committee to select the private sector partner.

The committee, which was also expected to suggest the investment pattern for the project, was reported to have made its recommendations to the PICUP authorities well in time. But PICUP could not take any decision on its partner till March 2, 1987, after which the LI stood automatically lapsed.

According to the existing licensing

ONGC, SCI Jt. venture likely

The proposed joint venture company (JVC) by the Oil and Natural Gas Commission (ONGC) with the Shipping Corporation of India (SCI) is expected to be operational by October.

According to informed sources, the Boards of the two promoting organisations have cleared the JVC proposal. The matter is now awaiting Cabinet approval.

The joint venture company will initially own and manage 20 offshore supply vessels (OCVs) presently owned by ONGC and 10 OSVs by SCI. A fully autonomous company, the JVC would have an authorised share capital of Rs. 300 crores and a paid-up capital of Rs. 28 crores initially. The equity participation in the company shall be in the ratio of 51:49 by SCI and ONGC respectively. The debt equity ratio of the company would be of the order of 4:1.

Of the 31 OSVs owned by ONGC, 20 will be made available for the joint venture company and the remaining facilities are to be sold to the Indian companies.

The fleet of vessels taken over by the JVC shall be chartered back to ONGC under the DG shipping formula (INSA) for a period of two years which shall be reviewed/renewed after every three years.

regulations, an LI will automatically lapse after its validity period, unless an application by the party concerned is made for its extension. PICUP made a representation to the Union Government after about four months LI requesting it to revive the lapsed LI.

The Government, however, decided against reviving it in view of the UP Government agency's inability to firm up partners for the project. One factor that went against PICUP was its relative inexperience in handling a petrochemical complex of this size.

The decision on not reviving the LI to PICUP was taken in December 1987 and the Department of Chemicals and Petrochemicals soon began the search for a new partner. Even at this time, the Government wanted the Saleempur project to be established in the joint sector.

Initially, the Department favoured the State-owned Indian Petrochemicals Corporation Ltd. (IPCL).

The proposed JVC, besides meeting the present requirements shall also meet any future expansion in the offshore supply vessel requirements by ONGC.

The board besides the Managing Director, comprises six to eight part-time directors, who shall be nominated in equal numbers of ONGC and SCI. The chairman of the Board of Directors shall be an ONGC nominee whereas the managing director shall be an SCI nominee. The staff for the proposed JVC shall also be drawn from both the organisations.

OSVs are the arteries which maintain the constant flow of supplies to the nation's oil installations in high seas. They transport potable water, chemicals, casing pipes, tools, spaces and accessories and food supplies for the personnel working offshore.

Since drilling is a round-the-clock activity, OSVs have to make innumerable journeys between their forward bases and oil installations. With the increase in the activity in Western and Eastern offshore, the requirements of OSV services have also gone up. Presently, ONGC owns 31 OSVs out of the total of 56 Indian vessels deployed in western offshore.

Deep sea mining programme

India has formulated a timebound action programme to undertake deep sea mining by the year 2005, reports PTL.

Under the programme, India would take steps to acquire the know-how for mining of polymetallic nodules from depths ranging from 4,500 to 6,000 metres and develop the technology to extract metals from the nodules.

Scientists in the department of ocean development (DoD) believe mining of nodules would be economically viable and would reduce the country's dependence on imports of copper, nickel and cobalt.

Dr. S.Z. Qasim, secretary, department of ocean development, said "India will soon start an intensive survey of the mining site, allotted to the country by the International Seabed Authority in the central Indian Ocean, for large-scale mining of nodules along with environmental studies."

He said a broad time-frame for development and commissioning of the commercial plant, which was expected to mine about three mil-

lion tonnes of dry nodules per annum, has been evolved.

Dr. Qasim said under the programme, the compilation of data would be completed by 1994, test mining would start in 1995 and commercial mining by 2005.

The pilot plant for nodule processing would be commissioned in 1990, semi-commercial plant by 1995, and commercial plant by 2005, he added.

Mr. S.K. Mukherjee, a senior official of the department of ocean development, said there are three methods — hydraulic lift system, continuous line bucket mining system and modular or shuttle mining system — used to mine nodules from the deep sea.

Quoting various reports, he said, the hydraulic mining system, which uses the principles of hydraulics in lifting the nodules to the surface, appears to be promising.

During the test mining, Mr. Mukherjee said, the nodules would be harvested in the one cruise and stored there. However, during commercial mining, separate bulk carriers would be deployed as transport vessels to maximise the utilisation

of the mining vessel with high degree of endurance.

Mr. Mukherjee said the transfer of nodules to transport ships could be achieved by two modes — slurry transfer or pneumatic or conveyor transfer.

Shore terminals would be required during the commercial mining stage for unloading and storage of nodules as well as for providing necessary logistic support to the mining operation.

Such ports could be set up either in Cochin on the West coast, or in Paradip on the east coast, he said.

Further techno-Economic studies to select the most suitable sites for the shore terminal would be conducted in due course of time, Mr. Mukherjee said.

Referring to nodule processing, Mr. Mukherjee said efforts were being made to evaluate various processes for the extraction of metals.

Based on the results of pilot plants the optimum route would be selected. For this process, a semi-commercial plant having a rated capacity of 170 tonnes per day would be installed in mid 1990 and based on the results of this plant, a commercial process plant would be set up with an annual capacity of three million tonnes, he said.

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TASK FORCE ON OILFIELD CHEMICALS

The Oil and Natural Gas Commission (ONGC) has joined hands with the Basic Chemicals, Pharmaceuticals and Cosmetics Export Promotion Council (CHEMEXCIL) in setting up a task force for accelerating indigenisation of oilfield chemicals.

Official sources said recently that the decision on the task force has been taken in view of the Commission's rising requirements of basic oilfield chemicals like ferrochrome lignosulphate, chrome lignite and fluid loss additives.

By an official estimate, ONGC's requirements for 1988-89 would be to the tune of Rs. 130 crores. By the end of the Eighth Plan, the requirements for major chemicals would be around Rs. 670 crores.

As the sources said, although a number of chemicals are at present being manufactured in the country either independently by the Indian companies or in collaboration with foreign ones, there is room for indigenisation to cut down on present imports.

Molasses export decision delay costs dearly

The country will suffer an avoidable loss of about Rs. 10 crores in foreign exchange on the export of molasses because of the tug of war between the sugar industry and alcohol manufacturers on one hand and vacillation by the Union Industry Ministry on this issue, on the other.

The sugar industry, which produces molasses as a by-product, has been leading for permission to export it for quite some time. However, in February this year when the Central Molasses Board met, the proposal was dropped at the instance of the Union Industries Minister, Mr. J. Vengal Rao, who was in the chair. The Minister said, the Government would rather have the country export alcohol, a finished product rather than molasses which was essentially a raw material.

As a follow-up, permission was granted to distillery industry to export 10 million litres of alcohol. But because of the wide difference between the domestic and international prices of alcohol, the proposal failed to take off.

On the other hand, with the progress of the sugar season, large quantities of molasses started accumulating with the sugar mills. The glut forced the mills to store molasses in open kucha pits, after they ran out of proper storage space.

When the Industry Ministry found its plan to export alcohol falling apart, it reconsidered its decision. It has now allowed the sugar industry to undertake the export of molasses. The Union Government has appointed the Indian Sugar Mills Association (ISMA) and the National Federation of Co-operative Sugar Factories Ltd. — the two organisations representing mills in the joint stock and in co-operative sector respectively for undertaking this job.

But the delay in taking a decision on this issue has cost the country dearly because in the meanwhile other potential molasses exporting countries have seized the initiative. Pakistan and Thailand, for instance, have sold off considerable quantities of molasses in the early part of the year at an attractive price of \$ 60 per tonne f.o.b. By the time India decided to enter

has already dropped to \$ 40-45 per tonne.

On an estimated export of four lakh tonnes of molasses this year, (a quantity which the Government has allowed to begin with) the country with a timely decision on this issue could have easily earned about Rs. 10 crores in foreign exchange than what it would now.

The sugar industry has also suggested that molasses exports should be allowed on a longterm basis considering its continuous large-scale availability and limited potential of its utilisation by the domestic distillery industry. In no year, the distillery industry has consumed more than 30/32 lakh tonnes of molasses, whereas its production is placed at between 43/45 lakh tonnes in years to come.

In the past, surplus molasses accumulated with the mills had to be stored in open kucha pits and was thus wasted. It also resulted in avoidable problem of pollution. On a rough and ready estimate, about 5 to 7 lakh tonnes of molasses is simply wasted during years of surplus production.

OIL, GAS USE: PANEL SOON TO FORMULATE LONG-TERM PROJECTS

Mr. A. Padmanabhan, Advisor to the Tamil Nadu Governor, said that a high-level committee to co-ordinate with the Oil and Natural Gas Commission and formulate long-term projects for utilisation of the oil and gas being explored by the ONGC in Tamil Nadu, would be formed shortly.

The committee would comprise representatives of the State and Union Governments, the Tamil Nadu Electricity Board and ONGC, he told newsmen at Annamalai Nagar near Cuddalore.

Earlier, he visited Kovilkallappal in Thanjavur district and Bhuvanagiri in South Arcot district where ONGC had explored for oil.

He said a five mw gas turbine-based power unit would be started at Kovilkallappal and a 3.3 mw unit at Bhuvanagiri at a cost of Rs. 5 crores each.

The Collectors of the two districts have been ordered to acquire lands for setting up the units, he added.

The Bhuvanagiri unit would have the potential to produce 30,000 cubic metres daily, he said.

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India glycols to enter market

India Glycols Ltd., promoted by Vam Organic Chemicals Ltd., is entering the capital market with an issue of 135.30 lakh equity shares of Rs. 10 each for cash at par for an aggregate of Rs. 13.53 crores.

Out of this, 15 lakh shares have been reserved for allotment to Unit Trust of India and another 7.5 lakh shares to SBI Capital Markets Ltd. These apart, 30 lakh shares are earmarked for preferential allotment to non-resident Indians on repatriation basis. A further one lakh shares will be allotted to farmers and rural investors.

The issue will open for Indian public on July 11 and for NRIs on July 9.

The company is setting up a Rs. 87.50-crore project for manu-

facture of 20,000 tonnes-per-annum of mono ethylene glycol (MEG) which has extensive use in the production of polyester. A main feature of the project is that it will use molasses as the feedstock which will reduce substantially the price of the end-product.

Vam Organic, the promoters, are already engaged in the conversion of molasses into ethanol and for its further conversion into MEG. India Glycols has entered into a technical collaboration with Scientific Design Company Inc. of the US. The US company is a world leader in MEG technology.

According to Mr. Hari S. Bhartia, Director, the plant is ideally located at Kashipur in Nainital district at Uttar Pradesh. It is

in the heart of the sugar belt of the country ensuring adequate and steady supply of the main raw material, molasses. India Glycols is the only company licensed to manufacture MEG in North India, he told newsmen in Madras recently.

MEG is finding increasing usage in a variety of areas like audio and video tapes, sun control films, coolants, break fluids and dehydrants. As a result, there has been a worldwide shortage of the product of late. The price has also shot up from \$600 to \$1100 a tonne.

Moreover, availability of MEG from overseas is also becoming difficult and as such, the company is assured of a long-term market. A plan to raise the capacity to 40,000 tonnes a year with an additional investment of Rs. 30 crores is also on the drawing board, Mr. Bhartia disclosed.

The work on the project is going ahead of schedule. The imported equipment is supplied by Toyo Engineering Corporation of Japan and the contract guarantees no cost overruns. The trial production is expected to begin in the middle of October this year and commercial production by the end of November.

Meanwhile, Vam Organics is planning another project for manufacture of spray dried silica, the details of which are being worked out presently. Estimated to cost Rs. 40 crores, the project will have financial and technical collaboration with Degussa of West Germany. The promoters will contribute 40 per cent of the equity and the collaborators another 40 per cent. The remaining 20 per cent will be offered to the public.

Spray dried silica is used in rubber, pesticides, tooth paste,

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etc., and is being currently imported from countries like France and West Germany.

COLOUR-CHEM STEPS UP DIVIDEND

Colour-Chem has suffered a setback in its working results during the year ended March 1988. However, the dividend has been stepped up by two points to 20 per cent, absorbing Rs. 158.81 lakhs against Rs. 142.93 lakhs.

Sales of the company (net of excise duty), amounted to Rs. 73.24 crores recording an increase of 9.4 per cent over the previous year of Rs. 66.95 crores. Off-take for products for the textile industry declined marginally from the levels achieved during the previous year.

Sales of pigments of non-textile applications also did not record improvement. However, sales of leather chemicals increased significantly due to spurt in the volume of exports of the leather industry. The off-take for organic chemical intermediates registered satisfactory growth.

The company's export earnings of Rs. 9.12 crores FOB during the year reflected an increase of about nine per cent over the exports of Rs. 8.39 crores in the previous year.

The profit before depreciation and taxation during the year amounted to Rs. 654.66 lakhs, against Rs. 795.58 lakhs. After depreciation (Rs. 230.94 lakhs against Rs. 301.33 lakhs) and taxation (Rs. 125 lakhs against Rs. 157 lakhs), the profit after taxation amounted to Rs. 298.72 lakhs against Rs. 337.25 lakhs.

After certain adjustments, the transfer to export profit reserve account (Rs. 32 lakhs against Rs. 39 lakhs), available for appropriation, amounted to Rs. 352.63 lakhs against Rs. 323.34 lakhs.

After proposed dividend, a sum of Rs. 100 lakhs against the

same has been transferred to general reserve and balance of Rs. 93.82 lakhs against Rs. 80.41 lakhs has been carried forward.

CHEMPLAST

Chemicals and Plastics India Ltd. has recommended a higher dividend of 25 per cent for the year to March 1988 against 15 per cent paid for last year. Apart from this, the company has also recommended a bonus issue in the ratio of one for one, subject to necessary consents.

The turnover moved up to Rs. 52.14 crores from Rs. 36.74 crores. Profit before interest, depreciation and machinery lease rent rose to Rs. 10.70 crores from Rs. 5.86 crores. After providing for interest Rs. 482.70 lakhs (Rs. 209.34 lakhs), machinery lease rent Rs. 4.35 lakhs (nil) and depreciation Rs. 311.41 lakhs (Rs. 120.16 lakhs), the

profit stood at Rs. 271.46 lakhs (Rs. 256.74 lakhs).

Provision for taxation claimed Rs. 43 lakhs (nil). Provision for taxation of earlier years written back amounted to Rs. 14 lakhs (Rs. 15.50 lakhs), transfer from investment allowance reserve Rs. 15.38 lakhs (nil) profit brought in of Rs. 131.88 lakhs (Rs. 55.97 lakhs) and adjustment relating to prior years Rs. 4.25 lakhs (nil). The amount available for appropriation worked out to Rs. 385.47 lakhs (Rs. 297.21 lakhs).

Of this, transfer to investment allowance reserve was at Rs. 88 lakhs (nil), general reserve Rs. 23 lakhs (Rs. 13 lakhs) and debenture redemption reserve Rs. 100 lakhs (same). The proposed dividend will absorb Rs. 87.22 lakhs (Rs. 52.33 lakhs). The balance carried over is Rs. 87.25 lakhs.

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Highlights in Chemical Technology (Part 1)

CERAMIC FILTER FOR CLEAN-UP OF HOT COAL GASES DEVELOPED

A cross-flow filter made of ceramic material that would be used for clean-up of hot coal gases is being developed by Westinghouse, with a funding of a \$1.3 million evaluation programme by the Department of Energy. The cross flow design is built up from alternate sheets of two types of porous lites with channels at right angles. Dirty gas enters a short channel, permeates the floor and roof, and then leaves as a clean gas via a long channel. Periodic reverse pulses of clean gas expel trapped particulate deposits.

Working with Westinghouse is filter element manufacturer Coors Ceramics Co. Dale L. Keairns, manager of the chemical and process engineering department at Westinghouse's R & D centre, Pittsburgh, Pa., USA, explains that future use of coal as a clean, and inexpensive energy source is tied to the ability to clean up the gases, while they are still hot and at high pressures.

The cross-flow filter is one of several technologies DOE has funded in an effort to develop ways of removing sulfur particulates and alkalis at temperatures above 1000°F. (*C & EN* 1/11/88, p. 19).

DEBITTERING OF CITRUS JUICES BY CYCLODEXTRIN ON THE HORIZON

Cyclodextrins are cyclic molecules that have been derived enzymatically from starch and have the ability to encapsulate other molecules

within their ringed structures. The commercial production of α , β and γ cyclodextrins is on the near horizon in USA. American Maize Products Co. (Hammond, Indiana) which will be petitioning in 1988 the F.D.A. for clearance to use cyclodextrins in food applications, is nearing completion of construction of a manufacturing facility in Hammond, Indiana, that is capable of producing several million pounds of cyclodextrin per year. As a result of five years of research the company is able to produce cyclodextrins at an economical cost. The search for enzymes that are more efficient in the production of cyclodextrins is currently open-ended and will continue to be open-ended for probably quite some time.

Cyclodextrins can lessen the odours of such products as fish, mutton, garlic, yeast products, soyabean milk, etc. They can also mask the bitter or off-tastes of orange and grapefruit juices. For example, 0.3% β -cyclodextrin added before a heat treatment removed the bitter taste of grapefruit juice. Another development is an insoluble copolymer resin which contains cyclodextrin.

This resin can be used for selective separations. One major application is the debittering of grapefruit juice. The polymer is reported to remove such bitter components as naringen and limonin from grapefruit juice.

In this new process (under development at the USDA laboratories in Winter Havens, Florida) an immobilized, chemically modified β -cyclodextrin polymer (developed by Amaizo) is currently employed to

debitter grapefruit juice. In this process cyclodextrin monomers are cross-linked with epichlorohydrin and the grapefruit juice is processed in a 7.6 cm., continuous-flow column with a bed volume of 800 ml. The process reduced naringen levels by 45% through 16 bed volumes before regeneration was required to remove trapped molecules.

The cyclodextrin polymer retained its ability to trap bitter components through 21 regenerations. Taste panels showed a 95% preference for the debittered juice over the control juice.

Because of these positive results, cyclodextrins can be used in future in the debittering of citrus products. Furthermore, a similar approach could extend to other applications, including debittering hops. In Japan, cyclodextrins are being used to complex both the clouding and bitterness components of Mandarin orange juice. (*Food Technol.* 1/1988, pp 98-100).

DIAMOND FILM TECHNOLOGY -- A NEW LANDMARK IN MATERIALS SCIENCE

Imagine razor blades that last forever, spectacles that will not scratch, or electronic chips that withstand hard radiation. Diamond film coating will put a new gloss in old materials and heralds a new direction in materials science.

Soviet research in recent years has developed a simple and ingenious way of growing diamonds in thin layer that does not require severe conditions. Japanese and American researchers are extremely excited

about the technological potential of this revolutionary new material. Soviet researchers are pioneers in this field. To grow diamond films, the Soviet researchers realised that they needed a source of carbon atoms that already had their bonds pointing tetrahedrally, as in diamonds. The carbon atoms in a hydrocarbon such as methane (CH_4) have a configuration of bonds similar to those in diamond, with a carbon atom surrounded by four hydrogen atoms in a tetrahedral arrangement. If you can remove the hydrogen atoms by heating the molecules of the hydrocarbon enough to break them up into their constituent atoms, you automatically have a source of tetrahedral carbon atoms. These can settle down on surface, layer upon layer, to produce a film with the structure of diamond.

The Soviet researchers spent almost 20 years developing a method of making diamond films using the process of chemical vapour deposition. One approach is to pass a few percent of methane in hydrogen over a hot filament (2000°C) in a silica tube inside a furnace at 800 to 900°C . The hydrogen reacts with any graphite that forms, preventing it from interfering with the diamond formation. The presence of hydrogen atoms also seems to be crucial in stabilising the tetrahedral configuration of the free carbon atoms.

Another ingenious way of assisting the process of diamond formation is to pass a discharge through the gas generated by radiofrequency or microwave radiation to create a plasma. The free electrons in the plasma accelerate and cause the molecules of hydrocarbon to dissociate; some of them are deposited on to a heated substrate to form a thin film of diamond. Both the Russian (Derjagium's group) and Japanese group headed by Seiichiro

Matsumoto (at the National Institute for Research in Inorganic Materials in Japan) have prepared diamond films using electrical discharges.

Japanese researchers have also employed ion-beams generated from a discharge in mixture of methane and hydrogen to produce diamond. Argon and hydrogen ions bombarded a graphite target knocking out carbon atoms which redeposit on a substrate. Researchers at Matsushita Electric Co. (Osaka) have recently prepared polycrystalline films of diamond with areas of non-crystalline hydrogenated carbon using ion beams at room temperature.

American companies, such as Crystallina and IBM are using plasma-assisted processes in the race to catch up with Japanese technology. Soviet researchers appear to be at least 8 years ahead of Americans in terms of understanding and research of diamond film technology. Russians can produce films more than a millimetre thick. The Japanese on the other hand seem to be well ahead in developing commercial applications.

Diamond film technology is a new landmark in modern materials science and will have a tremendous impact on high-tech industries. Diamond films are extremely hard, resistant to wear, water-proof and transparent. Machine tools, razor blades and bearings coated with a thin layer of diamond could last for ever. Diamond coated sunglasses or windows would not get scratched. A thin layer of diamond would protect a magnetic storage disc when the reading head crashes onto it.

Diamond is also a better conductor of heat than any other material, including copper, despite being an electrical insulator at room temperature. This means that diamond is

an ideal substrate for electronic devices. It would act as an extremely efficient "heat sink" doing away with the need for large cooling fins on electronic equipment.

Although diamond is an insulator, one can make diamond semiconductor by doping it with phosphorous or boron. Devices made from diamond semi-conductors are resistant to radiation. They would therefore be ideal for space communications, nuclear reactors, and military applications. Sumitomo Electric Industries is looking at diamond chips for applications in motor vehicles, where dirt and heat might damage silicon devices.

Diamond devices would operate much faster and at higher frequencies than the best that can currently be made from gallium arsenide, because the electrons in diamond move faster. They would also be able to deliver higher powers because electrical conduction in diamond breaks down at a much higher voltage than in gallium arsenide.

Diamond also has interesting optical properties. It is transparent in the UV and visible region of the spectrum so it could make an excellent window material for military applications and space vehicles. It may even be possible in future to make an UV laser from diamond. (*New Sci.* 3/10/88, pp 50-53).

A PRECISION-DRYING SYSTEM FOR FOODS AND PHARMACEUTICALS

A novel continuous low-temperature drier called PDS drier has been marketed by Precision Drying System (Princeton, N.J.). It is a new landmark in drying technology after freeze drying, vacuum drying and spray drying. The new PDS is based on the principle of

drier used for drying blood plasma in Scandinavia and Ireland, but is modified to include drying of several kinds of products. The range of products that PDS can dry includes eggs, fruits, vegetables, fish, as well as enzymes, vitamins, yeasts and antibiotics. It can dry a difficult product like sliced banana without breaking the slices.

The principle of the PDS drier is simple. It is described as a convective conductive drying method where the material is dried in three separate zones. The product is applied to drying balls in the application zone. As the drying balls and product move continuously downward at an adjustable speed through the drying zone, they pass a counter-current stream of temperature controlled drying air. In the separation zone at the bottom of the drier, the drying balls and product meet a co-current flow of air for fine drying and separation of product and drying balls. The drying balls are recycled to the application zone, where the process continues. The co-current stream of air carries the dried product to additional processing or packaging machinery.

The PDS drier claims several advantages over other driers:

The system is versatile. It dries liquids, slurries and particulates,

as well as high viscosity and low-viscosity materials. The key to the process are the drying balls, which can be made of stainless steel, plastic or ceramic. For instance, a sticky product, like cheese, would require drying balls made of a slippery plastic resin. The size of the drying balls can vary, as well. The biggest balls have a diameter of 1.5 inch. Such large sizes are needed for drying particulates made of large pieces, such as banana slices. Also, the dried product can take many diverse forms, from a crystalline powder to flakes of different size and thickness.

- * The drier operates at low temperatures. Most products are dried in a PDS drier below 160°F which preserves nutrients, cell structure, flavour and colour. Water content is reduced 75-95%, moreover. That cuts weight and shipping and storage costs significantly.
- * The process is continuous, which is generally more convenient and cheaper than batch processing. The continuous process also allows precise control of air flow, dwell time, temperature and moisture content. Dwell time, for instance can vary from 1 min. to 100 mins.
- * The drier is compact. Drying balls greatly enlarge the drying surface

area. As an example, 1 cu.ft. of balls with a diameter of 5/8 inch. create a drying surface of 60 sq. ft. Moreover, the drier requires less than one-third the space needed for conventional freeze or spray driers.

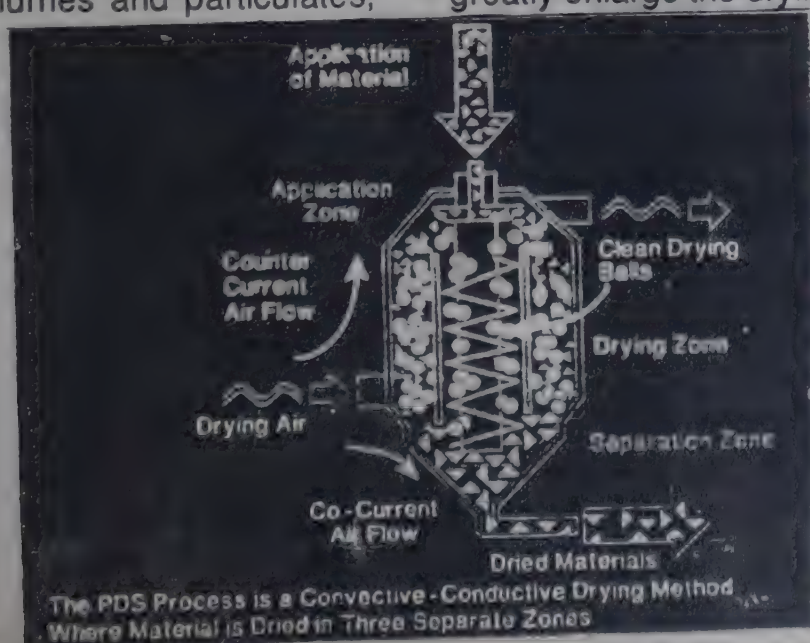
PDS will focus on food and pharmaceuticals applications. It is particularly attractive for food drying because of the low temperature that is involved in drying, crowning -- common in conventional drying of potatoes, which is done from 250 to 300°F -- does not occur.

According to the Company's claims, PDS drier offers economic advantage in operation costs. Estimated manufacturing cost for the PDS drier is 8-11 cents/lb of water removal capacity. That includes labour, utilities and maintenance, as well as depreciation overhead. Such costs are one-third of those for freeze drying, which costs 25-30 cents/lb of water-removal capacity. A vacuum drier is double the cost of the PDS drier, at 16-21 cents/lb of water-removal capacity. However, a spray drier -- at 7-10 cents/lb of water-removal capacity -- is only slightly cheaper than the PDS drier.

The PDS is keen on selling PDS driers to food and drug companies. The drier costs from \$ 400,000 to \$ 3 million depending on size and application. (*Chem. Wk.*, 2/3/88, p. 36).

BORON NITRIDE-BASED COMPOSITE CERAMICS PIONEERED BY KAWASAKI STEEL CORPORATION

Kawasaki Steel Corporation of Japan has developed three types of boron nitride (BN) based composite ceramics containing aluminium nitride, alumina and zirconia respectively. These achievements are the result from the combining of the



company's inhouse developed slip casting and normal pressure sintering technologies.

BN-aluminium nitride ceramics feature high thermal conductivity and BN-alumina/BN-zirconia ones are characterized by strong thermal shock resistance and low thermal conductivity, respectively. All of them have such high BN content that they are imparted with machinable properties.

In producing these ceramics the metallurgist adjusts the sizes of the BN and counterpart component particles to 1 micron, blends them with binders and dispersants in water and sinters the resultant product under normal pressure.

The special know-how required is related to selection of speciality binders and dispersion of all the components.

The production technology facilitates manufacture of molding with complicated forms, enables control of BN addition and is suitable for mass production of composite ceramics. (*Japan Chem. Wk.*, 4/7/88, p. 5).

A NEW HIGH PERFORMANCE ANTIOXIDANT FOR PLASTICS DEVELOPED BY SUMITOMO CHEMICAL

Sumitomo Chemical has developed a phenyl-based high performance antioxidant (trade name: Sumilizer GA-80) having markedly high degree of thermal resistance and resistance against discoloration induced by oxides of nitrogen.

The new antioxidant is produced by methyl acrylate to 2t-butyl-6-methyl phenol and subsequent interesterification with Spirobutyl. To find application fields for the product, the company is looking for application in ABS resin and polypropylene. The product is reported to be superior to those commercialized by Ciba Geigy and American Cyanamid. (*Japan Chem. Wk.*, 3/31/88, p. 5).

GLASS MAGNETIC DISCS DEVELOPED IN JAPAN

Research at Japanese electronic company has been successful in developing 'glass magnetic disc'. A Japanese electronics company in conjunction with a computer related

American manufacturer, has developed a glass magnetic disc that has a data storage capacity of 5-10 times higher than the aluminium disc used widely in computers today.

The disc consists of a substrate glass that has a sputtered surface coating of magnetic material, thus giving it properties that are characteristic of glass such as rigidity and a smooth hard surface.

This eliminates the need for the nickel-phosphorous plate layer which is necessary for the aluminium substrates. The smooth glass surface reduces the gap between the readout magnetic head to sub-micron order (sub-micron = 1/10,000 of 1 mm), to give it a larger data storage than its A1 counterpart.

Available in two sizes, 3.5m and 5.25m., the discs are to be sold at \$25 each, a similar prices to those made of Al. The Company hopes to export the glass substrates to USA and to perform the sputtering operation locally. The inventors believe it will only be a matter of time before the new discs have completely superseded aluminium alternatives. (*Glass Intl.*, 3/1987, p. 7).

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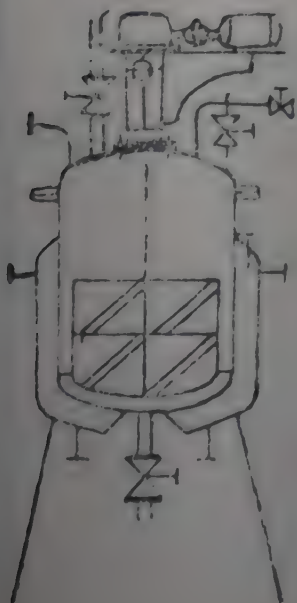
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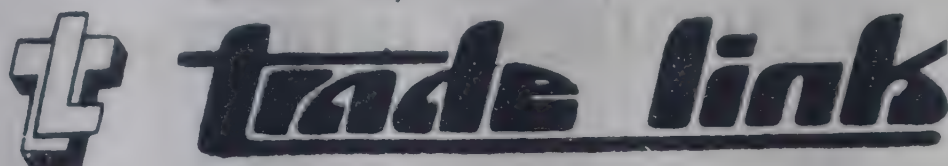
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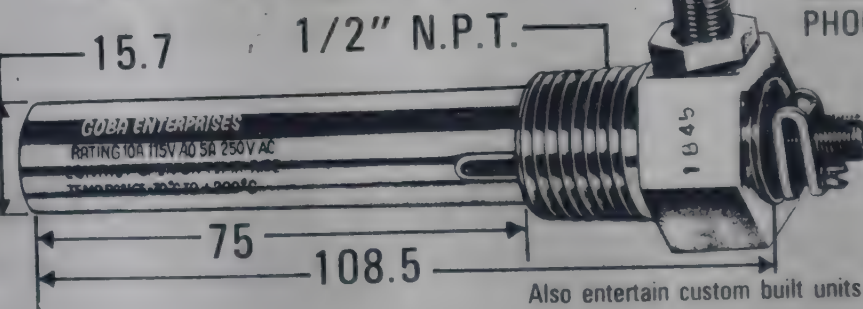
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Chemical Plant Developments

JAMES LOCK

Consulting Editor, "Processing", London

MAXIMUM CONTROL FLEXIBILITY FROM MODULAR DESIGN

IBS Ltd. has developed a new approach to fermentation process designed to offer a variety of control, documentation and utility modules from which users can select a system to suit their particular needs.

The key is in two modules -- the master and fermenter control systems -- which data log, date stamp and control the fermentation process according to the user's set requirements. Moreover, other modules can be selected around this core to generate their own package. The range is constantly updated to take into account the increasing sophistication of computer power and the possibilities this allows for control and documentation.

A report generator permits the user to keep a permanent record of initial quality control parameters, a detailed report of the fermentation process, and any subsequent downstream processing details that need to be recorded for a particular fermentation. There is also an economist package that works out the optimum times for switching on the fermentation cycle, allowing the user to take advantage of cheap energy and make comparative costings of different options.

Interface packages are available for any novel downstream control modules that may be originated in-house. These would be produced after discussions with the customer on his existing software control schemes.

Also available is an online and off-line analysis module and a statistics package that provides numerical information. There is a package that allows the user to define his own functions for graphical reports, another feature to compare parameters from different or similar fermentations.

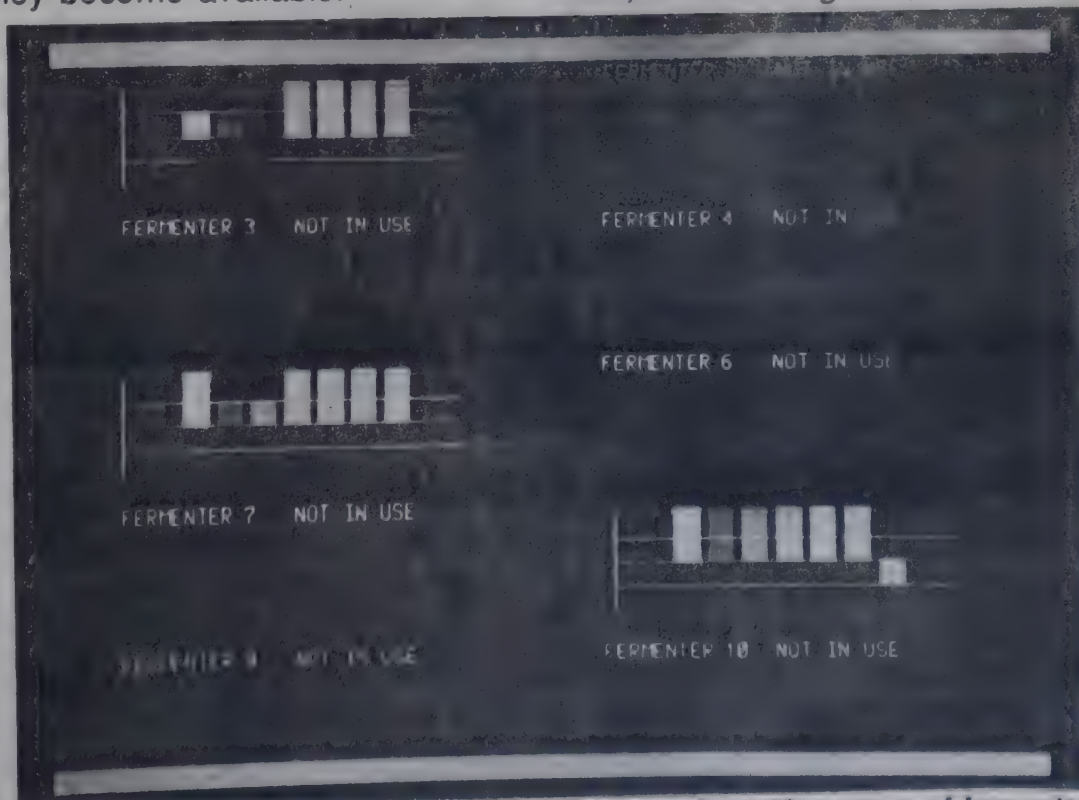
Finally, there is a modem notification of control. This package will telephone a designated plant manager at home at any time of the day or night if alarm levels are breached during the fermentation process. It will indicate to the manager which variable is at the critical level. By choosing Unix as the operating system and C as the programming language the user is not tied to any single machine make, type or size. Almost any computer will run the IBS software. Moreover, because of the design of the system, artificial intelligence modules can be added once they become available.

Due to Unix's standard I/O format, the software does not care what type of fermenter it is talking to. The signalling involved is handled at the device interface level and can be used with any mixture of fermenter types.

Nearly all Unix-based systems are designed with an Ethernet Network Interface. This has the same standard I/O characteristics as the rest of the system so that operators can control or log remotely through other computers.

Using the IBS system, the same software can be applied to laboratory, pilot or plant fermentation. The retraining of staff for different system is not necessary and the software can be easily extended or amended to meet specific requirements.

For further details contact: IBS Ltd., 34, Okehampton Road, London, United Kingdom, NW10 3ER.



(a) Typical graphic of a fermenter system. (b) Operating with a group of fermenters.

MANAGING SOLUTIONS TO COMPLEX NOISE PROBLEMS

Accent systems, formerly known as ICI Acoustics but now a member of Enterprise Oil Plc. specialises in acoustic and environmental technology and provides both purpose-designed hardware and a professional consultancy service, as well as undertaking the complete project management of solutions to complex acoustic problems.

In a recent contract, Accent Systems was commissioned by GEC Turbine Generators' large steam turbine division to design and supply two sets of turbine cleading for the 500 MW GEC turbine generators under construction for the coal fired power station owned by National Thermal Power Corporation of Rihand, Uttar Pradesh.

The noise criterion to be met was 90 dBA maximum, measured 1 metre from the cleading. A composite steel acoustic panel system was required that could satisfy both the practical and aesthetic aspects of the contract.

The turbine cleading is 12m long x 11.5m wide x 6.5m high, enclosing the high pressure and medium pressure stages of the steam turbine. It incorporates Accent Systems' purpose designed structural acoustics panels which provide the necessary structural rigidity over the buildings' full span, using the minimum amount of supporting steelwork. The two housings were fully trial-assembled and inspected before being dismantled for packing and export to India.

In a dosimetry study undertaken for Scott Ltd. (formerly Bowater Scott) at its Barrow-in-Furness paper mill in Northwest England, the contract was to undertake the first stage of an extensive occupational noise dosimetry study. A radical new approach was used that involved profiling noise dosimeters with large data storage capabilities, together with on-site down loading of the computer processing and data. Scott Ltd. has information within 24 hours on the noise levels of any 15 employees in acoustically critical locations. More importantly, there was the ability to see, minute by minute, how those noise levels

have changed through the working day.

These small dosimeters, carried around by employees, brought together accurately both the noise level and the information on employees' location during the day. This built up a quantitative picture of the noise dose experienced by each employee and the consequent potential hearing hazard.

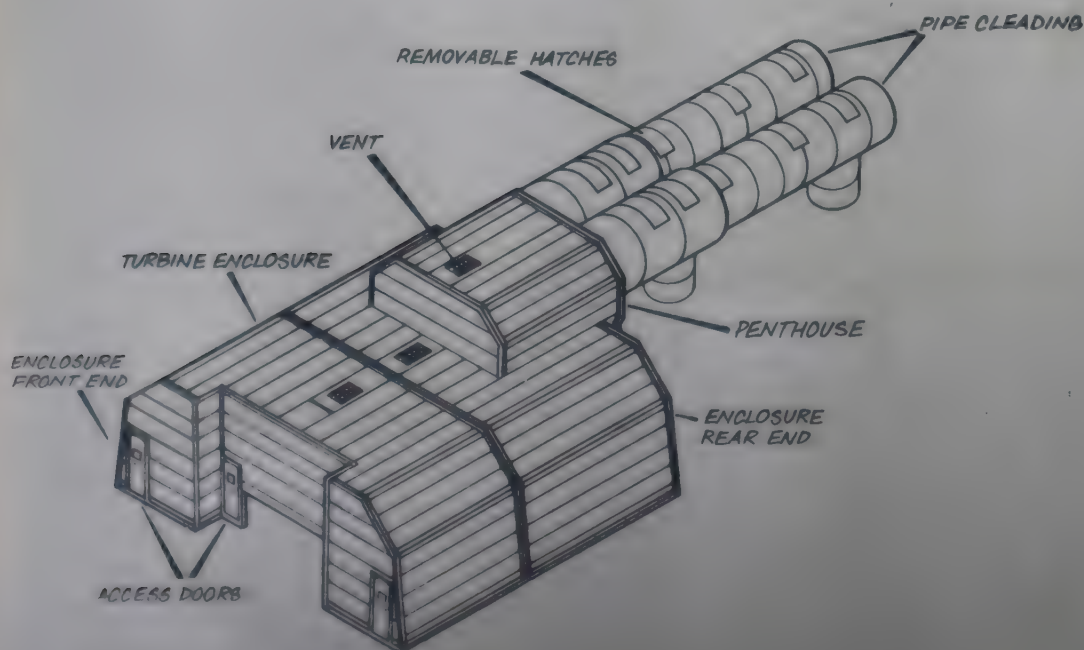
The new generation of profiling dosimeters is a breakthrough in practical and accurate dosimetry. Combined with the sophisticated computational and statistical analysis procedures used by the company, this dosimetry service does, Accent Systems believes, represent a major advance in the technique of measuring and assessing the dangers of loud noise in the workplace.

For further details contact Accent Systems, P.O. Box 41, Middleton, Manchester, United Kingdom, M24 1SP.

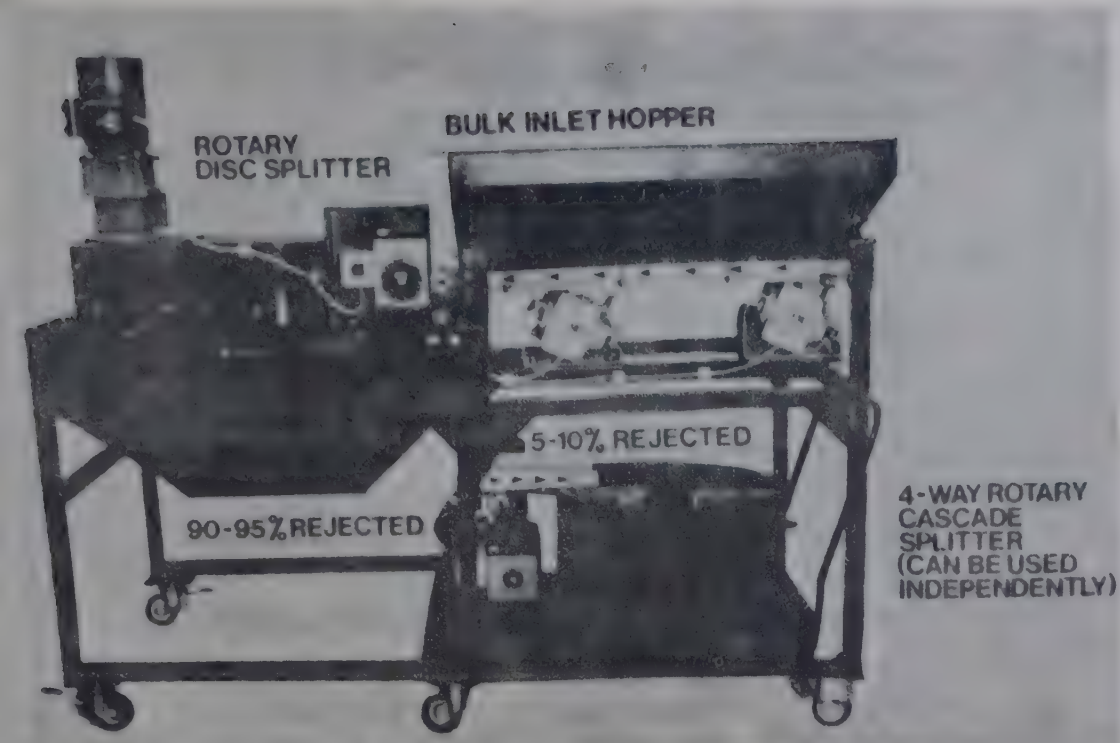
SPECIAL PURPOSE ROTARY DISC AND CASCADE SPLITTER

Test & Process Plant Ltd. has designed and produced a special-purpose sample splitter for Conoco. Bulk coke samples, weighing up to 300 kg. per batch, but transported in up to 18 separate bags, are fed into the inlet hopper of a rotary disc splitter.

A variable amplitude vibratory feeder transfers the sample at a constant rate to the splitter, which can be adjusted to reject between 90% and 95% of the sample. The balance is fed by a second vibratory feeder to the rotary cascade section. This is arranged in four segments, so that each will ultimately contain a sample, typical of the bulk batch, which is only between 1% and 1.5% of the original volume.



Accent Systems' turbine cleading for the GEC power station at the National Thermal Power Corporation's Rihand coal fired power station in Uttar Pradesh.



The special purpose sample splitter by Test & Process Plant.

An unusual feature of the design is that the two sections -- the disc and the cascade splitter -- have been designed so that each can operate independently as a sample splitter device. They are separately powered, and for normal operation (combined) the two sections are simply slotted together.

Test & Process Plant makes a comprehensive standard range of splitters of several types, test sieves and sieving equipment, and various size reduction mills.

For further details contact Test & Process Plant Ltd., 3, Cowley Mill Trading Estate, Uxbridge, Middlesex, United Kingdom.

ADVANCED GENERAL PURPOSE CENTRIFUGE

MSE, a company in the Fisons Scientific Equipment Group, has developed the MSE mistral 6000 floor-standing refrigerated centrifuge for all general purpose applications.

The MSE 6000 is capable of accommodating up to six 1-litre bottles or, alternatively, a large number of small tubes, for example 360 6.5 ml tubes.

Developing a maximum RCF of 600 xg (swing-out rotor), the rate of acceleration and deceleration can be adjusted independently to suit most requirements and the centrifuge can be operated at temperatures from -19°C to 40°C.

Claimed as unique, the integrator registers g-seconds and therefore

accumulates the centrifugal force experienced during both acceleration and deceleration in addition to the set run time. Hence, when used to control the run, it will reproduce the required conditions precisely. All run parameters can be stored to battery protected memory and recalled at will to reproduce exactly the programmed run conditions.

Included in a comprehensive three-year product support plan covering the whole instrument, the Mistral 6000's induction motor is brushless and therefore requires no maintenance. The unit also incorporates several safety features, such as lid-lock while the motor is in motion, dual independent over-speed prevention systems, cut-out for over-temperature at 45°C, and sealed buckets for hazardous samples.

For further details contact MSE, Sussex Manor Park, Gatwick Road, Crawley, West Sussex, United Kingdom, RH10 2QQ.



The MSE Mistral 6000 general purpose floor-standing centrifuge.

ADVANCED TECHNOLOGY DUST FILTRATION

DCE Ltd. describes its Sintamatic filtration technology as the first major breakthrough in dust control for 30 years. It comes from the development of a dust filter incorporating a PTFE-based coating on a high grade porous composite as its filtration medium.

This, unlike its traditional fabric counterpart, is a rigid self-supporting element offering extremely high filtration efficiency. Designed to give complete resistance against prema-

ture wear and sudden failure, the elements are exceptionally compact, giving three times more surface filtration area than the conventional fabric filter.

The Sintamatic filter elements are incorporated within a purpose designed housing. Constant operation of the filter is ensured by the electronically controlled automatic reverse jet cleaning system -- a development of DCE's Dalamatic continuously operating filter system, already used in over 100,000 filters worldwide. Collection efficiency is such that effluent concentrations are reduced to levels eliminating the need for secondary filtration.

The elements are manufactured from high grade engineering composites in a process incorporating the latest robotic and microprocessor technology. A carefully controlled blend of granulated engineering polymers is dimensionally restrained and then subjected to a special process to produce a rigid, porous composite element.

To ensure maximum filtration capacity properties, the surface of the element is impregnated with a PTFE-based solution to form a microporous skin. This creates an element that is a highly effective barrier to all dusts, has high mechanical integrity and is resistant to most chemicals.

The technique used to apply the coating allows the PTFE-based material to migrate into the porous element surface. Consequently, miniature perforations, which may occur due to abrasion, will not affect the overall performance in the same critical manner as occurs with a flexible fabric/membrane laminate, where the result may be excessive dust release through the filter, followed by plant shutdown and high maintenance costs.

DCE says the rigidity of the Sintamatic element ensures greatly improved cleaning efficiency; 100% of the air pulse energy is used to remove the dust cake rather than being absorbed by bag or cartridge deflection -- a characteristic of traditional filters.

The Sintamatic series SU range dust control units are for process applications requiring air volumes in the range of 800 m³/h to 8000 m³/h. The filter is available in six basic sizes of filtration area, with or without fan, and each unit can be supplied with either a hopper to accept a rotary valve or with an integral dust container.

Alternatively, by using the filter and fan sections only, it can be fitted directly on to a purpose built storage container or be integrated into the process machinery.

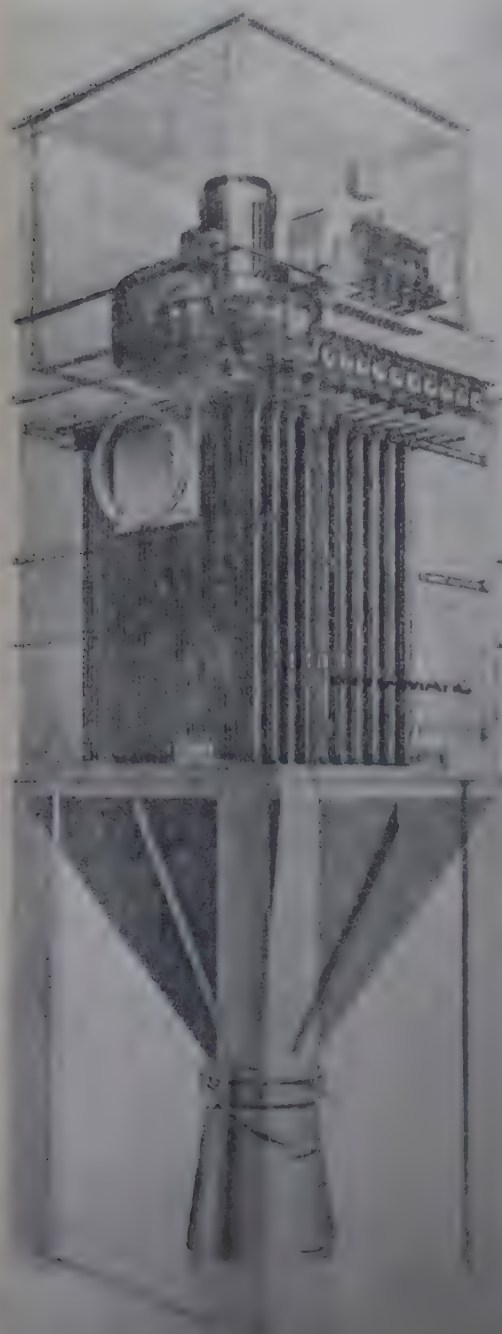
For hygienic or other high specification applications the Sintamatic is available with high grade stainless steel components. Typical applications include mixers, mills, sieves, packing machines, powder spraying, tipping and conveying.

For further details contact DCE Ltd., Humberstone Lane, Thurmarston, Leicester, United Kingdom, LE4 8HP.

MULTI-FUNCTION CONTROL UNIT

The P4000 H-FM multi-function control unit is a new instrument controller for three-term automatic control of process loops, either independently or in association with distributed and integrated control systems.

Introduced by Kent Process Control, of Luton, north of London, it can be used for single-loop operation, or for two inter-related loops acting on



Inside view of DCE's Sintamatic filter, showing the rigid filter elements.



The new Kent P4000 H-FM multi-function control unit

one output device as, for example, in a cascade, radio or auto-selector configuration. It is user-programmable, with built-in indicating, alarm, control, signal processing, flow correction, totalising and logic features. Designed to meet a wide range of automatic control requirements in industrial process plants, the comprehensive function range of this microprocessor-based, panel-mounting instrument enables control schemes to be configured efficiently and economically, while maintaining operator visibility of plant loop conditions.

The H-FM is well suited as a retrofit for ageing single loop controllers, packing more functions and features into less space. Moreover, where two single loop controllers are currently used for a cascade or ratio loop, this controller does it in one. For users of Kent Flexel instruments, the H-FM can be supplied to plug directly on to existing ribbon cable in Flexel single and multi-way bins.

Because of its built-in capabilities, the controller can be used without ancillary equipment, such as transmitter power supplies, square root cards, gas flow multipliers, trip amplifiers, integrators, scaling and bias units, relay logic and other units.

Built-in configuration tools eliminate the need for a separate programming device or software programming knowledge. Powerful real time diagnostics identify three levels of failure and show corresponding fail-safe actions.

Other features include a two-channel audible/visual alarm; pressure and temperature compensation in-flow measurement applications; four variables on 100 mm bar graph displays; an internal eight-digit totaliser; and a serial communications link to process computer systems.

For further details contact: Kent Process Control Ltd., Biscot Road, Luton, United Kingdom, LU3 1AL.

NEW HYGIENIC SEAL

John Crane UK Ltd. is introducing its Type 87 mechanical seal for rotary lobe pumps. Designed initially for food processing applications, the Type 87 can withstand pressures of up to 2 MPa, 50% higher than previous designs.

Its main features are short axial length and large clearances for easy cleaning. Crane says its non-clogging profile, robust construction and design enable the seal to be

used for highly viscous and high pressure applications.

The Type 87 can work efficiently at temperatures up to 280°C, dependent upon the elastomer material. Standard materials include FDA approved grades of medium nitriles, ethylene propylene and fluorocarbon.



The new Type 87 food seal capable of coping with 2 MPa pressure.

John Crane UK Ltd. says the majority of pumps in a food processing plant can be fitted with either the Type 87 or the Type 515E. The latter is a formed metal bellows seal with asymmetric features designed for easier maintenance.

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For further details contact John Crane UK Ltd., Crossbow House, 40, Liverpool Road, Sough, United Kingdom, SL1 4XGj.

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Chemical News from Abroad

DOW POISED TO MUSCLE IN ENIMONT DEAL

Dow Chemical averted inciting a declaration war in Italy recently when, at the eleventh hour, it decided not to attend the May 11 shareholders' meeting of profitable Montedison financial services subsidiary, Meta, to protest against its transfer to parent group Ferruzzi.

The financial arrangements involved in the stripping out from Montedison of prime asset Meta, in which Dow holds close on 2 per cent, are recognized as irregular. However, Dow's arrival on the scene at the last minute and its letter of protest to the Italian stock market regulatory authority came surprisingly late in the day, irritating Montedison chairman and architect of the share shift, Raul Gardini, and raising Italian eyebrows elsewhere.

The US company says its protest was aimed at protecting its investment in Montedison, now standing at 4.37 per cent. Recently, Dow's precise intentions towards Montedison remained a well-kept secret. It was clear, however, that the US major had, as one close observer put it, got itself "invited to the wedding party" of the two Italian chemical giants, Enichem and Montedison.

Dow has declared to the US government that its Montedison stake has reached a certain threshold and says this was necessary to permit it "to respond to industry discussions" in Italy. Under its US declaration, Dow is not allowed to increase its shareholding in the Italian firm for 30 days.) The name of former

Montedison chairman, Mario Schimberni, who was ousted by Gardini, has been linked with Dow's recent purchase of Montedison and Meta shares.

The US firm says it is not interested in acquiring Montedison. It may certainly be interested in many of Montedison's businesses however, including both those slated for merger with Enichem and, notably, the drugs business, Erbamont, which will remain with Montedison.

Delicate and long drawn out negotiations between the state-owned Eni and Montedison are due to result in the signing of a with the aim of merging all of letter of intents any day now, Enichem's assets with selected businesses from Montedison.

It is believed that a new company, called Enimont and headed by Enichem chairman Lorenzo Necci, is to be formed.

Among assets to be transferred from Montedison include the Montedipe styrene and styrenics and polyurethanes activities, which could be useful to Dow. Montedipe is building a new 200,000 ton/year styrene plant at Mantua and a downstream polystyrene unit may be under consideration. Dow is already linked to Montedison's styrene business through various swap deals providing feedstock for the companies' various styrenic units in northern and southern Europe.

Of even greater interest, perhaps, is the polyurethanes sector — which was at one time to be excluded from the Enimont deal. Dow has ambitions to become the world's leading polyurethanes firm and at present in Europe trails well behind Bayer, the "Grandfather" of the business.

Montedison claims a 10-11 per cent market share in Europe with 10,000 ton/year methane diisocyanate (MDI) at Brindisi, 55,000 ton/year of polyols at Priolo and 80,000 ton/year of toluene diisocyanate (TDI) — said to be one of the largest in the world — at Porto Marghera.

Dow does not have a TDI position in Europe and thus could find the Montedison business interesting although, according to Peter Phillips, business manager for Dow's speciality urethanes: "The Montedison plants are very much integrated and on different sites. There is no practical way an outsider could come in and operate them." Dow is showing its commitment to the polyurethanes business at the moment with plans for a new MDI unit in Europe.

Recently Dow's president and ceo Frank Popoff said he considered there were better investment opportunities in Europe today than in the US, where competition has been fierce to acquire chemical assets. Dow recently pulled out of the bidding for US ABS resins producer Borg-Warner because the price was too high. The firm is linked to Enichem in an epoxy resins joint venture.

Further complicating the Italian chemicals picture, meanwhile, other firms are starting to declare their interest in certain Montedison assets. Fibres and polymers group, Snia-Bpd, a subsidiary of the Fiat car firm, last week said it would like to be included in talks concerning an Italian chemicals reshuffle. Montefibre, the fibres arm of Montedison, specialized mainly in acrylics and nylon, is believed to be ready for an early sale.

ICI also emerged as a potential suitor for Montedison. The UK and Italian firms have several petrochemicals businesses in common, including fibres, fertilizers, polyurethanes and fluorine chemicals.

Regarding the latter, as we went to press it was speculated that fluorine chemicals maker Ausimont was close to an ownership change. Its profitable Montefluos subsidiary has been eyed by 3M, Hoechst, Bayer, Du Pont and ICI, it is believed. Ausimont has announced operating profits up 7.5 per cent to \$766m and net profits of \$56.6m.

AGA STRENGTHEN FRENCH OPERATIONS

The Swedish industrial gases group Aga has given a further lift to its operations in France with the acquisition of Nice-based Liquefaction de L'Air SA. The company, described as a market leader in the Mediterranean area, has air separation, speciality gases, hydrogen and acetylene plants. Its main customer base is in the electronics sector.

Aga's latest move takes its share of the French industrial gases market up from around 10 to 11 per cent and consolidates its base in the south west.

Turnover at Liquefaction de L'Air was put at FF73m (\$13m) in 1987. The purchase price was in the industrial gases sector not disclosed, but recent deals have seen companies pay high prices to build up market share.

The acquisition is subject to final approval by French and Swedish authorities.

CARBIDE PRODUCES REPORT ALLEGING BHOPAL SABOTAGE

Sabotage carried out by a disgruntled employee was the cause of the 1984 Bhopal poison gas leak, according to a report commissioned by Union Carbide and presented by Arthur D. Little. Last week, Ashok Kalelkar, a senior vice president with the US consultancy, told a London conference on accident prevention that water was hosed directly into the methyl isocyanate (MIC) storage tank through a pressure indicator inlet, causing a violent reaction and the fatal MIC vapour cloud.

The Union Carbide investigation, which involved Arthur D. Little, began in 1985 when investigation restrictions imposed on the pesticide plant were lifted by the Indian government. Over one and a half years the investigating team interviewed 70 employees from the plant, tested equipment and carried out scientific experiments.

As a result, Union Carbide rejects as "totally impossible" another suggested cause. The Council of Scientific and Industrial Research (CSIR) put forward a "water washing" theory in 1985 after its investigation for the Indian government. It contends that bad plant management, design and maintenance resulted in wash water used to clean pipes on the night of the accident, flooded into the MIC storage tank and initiated the runaway reaction.

Criticizing Carbide's sabotage theory, the Bhopal action group accuses the US company of attempting "to divert attention from the far more important health, safety and technical issues" The group adds that the

sabotage theory has no scientific basis. Under conditions stated by Union Carbide the runaway reaction could not have occurred as quickly as it did, the group claims.

Further the Institute of Chemical Engineers, which organized the conference, is accused by the action group of providing Union Carbide with a platform to propagandize.

In India, preliminary hearings in the Indian government's suit against Carbide resume on June 16. The US firm has requested that Judge Deo of the district court be removed, arguing that he has prejudged the case by ordering Carbide to pay interim relief (see ECN December 21-28, 1987).

The trial proper will follow these preliminary hearings and a period of discovery, which allows both sides to study relevant documentation. Carbide claims that it will name the alleged saboteur during the trial.

The company says it accepts moral responsibility for the tragedy, but it is attempting to clear itself legally.

FRENCH DETERGENTS DEAL BLOCKED

The French authorities have given the thumbs down to the joint venture detergents deal Cotelles-Lesieur planned by Henkel and Colgate-Palmolive.

The two companies planned to operate a 50/50 joint venture for the manufacture and marketing of a range of household detergents and cleaning products acquired by Henkel in June 1987 from the Lesieur group. The West German firm paid DM615m (\$366m) for the business and subsequently sold Colgate a half share for DM272m.

France's competition council said a joint subsidiary set up by the two detergent manufacturers would give them market shares in certain areas exceeding 50 per cent, thus breaching competition rules.

A Henkel spokesman said of the decision, "I wouldn't say we were happy. We thought we had created an interesting model with Colgate. We could have been strong competitors." He said that the brand names acquired through the Lesieur deal had been divided up between the two firms with certain products fitting well with their respective portfolios.

Of the three manufacturing facilities involved, Henkel was taking one and Colgate two plants. Talks were still underway regarding the research centre.

Henkel regards the French market as an important part of its overall operation. In 1988, its contribution to total sales of around DM9.3bn is expected to be between DM1.3-1.4bn. The company spokesman said that further expansion could be achieved through internal growth but added Henkel was also interested in acquisitions "if it makes sense." It ranks number three in the French detergents market and also claims to be one of the leading producers in Europe, together with Lever and Procter & Gamble.

REPSOL IN TALKS

Spain's state-owned oil and petrochemicals group Repsol has confirmed that talks are under way with the ailing Portuguese chemicals concern, CNP.

Earlier reports indicated that Repsol is seeking a 10 per cent stake in the company. Such a

move would be in line with chairman Oscar Fanjul's promise of acquisitions and expansions this year and also boost Repsol's product shortfall.

MERCK SELLS JAPANESE BUSINESS

US Health care concern Merck & Co has reached agreement on the sale of its 50.54 per cent stake in Japan's Torii & Co to Asahi Breweries. The selling price was not revealed but estimates suggest a figure well in excess of \$200m on the deal.

The disposal leaves Merck's Japanese interests concentrated in Banyu Pharmaceutical in which it has held a majority stake since 1983. The US drugs giant said future efforts in research and development and production and marketing would be carried out through Banyu. The two companies have announced their intention to build a major new research facility in Japan, but details of the size of the investment and its timing were not yet available. Links with Torii will be maintained through licensing deals.

In recent years Asahi, a major Japanese brewing company, has intensified its investment in pharmaceutical R&D, particularly in biotechnology related to its fermentation business. It said the deal would "make an invaluable contribution to the future growth and prosperity of the pharmaceutical business of both Torii and Asahi." Torii has sales of around \$200m and manufacturing facilities in Sakura, Japan. It also has a research facility in Ichikawa.

According to Neil Sweig, drugs analyst with Prudential Bache in New York, Merck's decision to

pull out of Torii reflected satisfaction with its links with Banyu which ranks among the top 15 pharmaceutical firms in Japan.

BOC SELL-OFF

The UK industrial gases and health care group BOC says the sales of part of its carbon business to Japan's Showa Denko KK is going ahead after the US antitrust authorities failed to raise an objection within the required waiting period.

BOC sought out a new buyer for the business after a long drawn out investigation by the antitrust authorities into a proposed deal with Horsehead Industries. Horsehead subsequently filed a damages suit against BOC.

Under the deal with Showa Denko, BOC is selling its carbon electrode plant at Ridgeville, South Carolina for \$70m. In addition, the Japanese firm will pay for inventories valued at around \$11.2m while BOC retains monies due from debtors. It hopes to net up to \$100m from the deal.

The balance of BOC's carbon assets comprise two further carbon plants and a needle coke production facility. These, together with its US calcium carbide business, are being sold to a leveraged buy-out consortium. Negotiations are said to be going smoothly.

AKZO AND DU PONT SETTLE ARAMID FIBRES BATTLE

After years of wrangling and worldwide litigation, Du Pont and Akzo have finally reached agreement to end their para-aramid fibres dispute. Details of the settlement are not being dis-

closed but the companies say, that, in general, each group grants the other patent licences in the para-aramid area worldwide. A spokesman for the Dutch group said that all pending litigation is now being terminated.

Undoubtedly the winners in the dispute are existing and potential customers who will no longer face uncertainty of supply. But for Akzo the agreement now gives the company the right to import its Twaron aramid fibre into the US, the major world market for aramids used in defence and aerospace.

Until the settlement, the Dutch group had been banned from importing its product into the US. The ban, imposed by the US international trade commission, followed a decision by US courts that Twaron infringed patents held by Du Pont for its own aramid fibre, Kevlar. An Akzo spokesman said the Dutch group will now be allowed to bring Twaron into the US in certain, unspecified quantities which will be gradually expanded. He added that Akzo would now concentrate on market development in the US.

Negotiations to reach a settlement have been taking place intermittently but were given added impetus by some recent court decisions in Akzo's favour. The Dutch group claimed Kevlar infringed its solvent patent for Twaron and this claim has most recently been upheld in the West German courts.

The US aramid market is currently worth around \$300m and earlier estimates suggested that Akzo might take a share of this up to 10 per cent. But the market is growing and Du Pont has suggested a potential world mar-

ket worth over \$3bn. The aerospace sector could be consuming up to \$1.5bn of aramid fibres by the end of the century. In Europe demand is currently approaching 4,000 ton/year and is growing by 15-20 per cent.

Both companies have invested heavily in aramid development and production. In 1986, Du Pont said it had spent \$200m developing Kevlar and a further \$500m-plus on capital investment.

Akzo, meanwhile, reckons to have spent Dfl.600m, (\$319m) on capital investment following a "considerable" expenditure on development.

BOC LINKS WITH DOW IN GAS VENTURE

BOC has joined forces with Dow Chemical in the US to exploit the non-cryogenic industrial gases market. A letter of intent was signed recently after a year of negotiations and the joint venture should be operational by the end of 1988. The companies have filed for US anti-trust approval.

The new company will combine Dow's developments in membrane technology with BOC's pressure swing adsorption (PSA) technology and will be backed by the UK firm's gases applications expertise.

The chemical industry, together with other sectors including petroleum, marine, food and metal processing, have been targeted by the venture which will manufacture and sell non-cryogenically produced nitrogen and oxygen.

Estimates value the world nitrogen market as high as \$4bn and it is singled out as the fastest growing gas at around 6 per cent/year. Noncryogenic applications could corner up to a third of this growth giving a potential market of \$500m in the next five years.

No details are, as yet, available as to the funding involved or projected sales figures for the new 50/50 joint venture but SOC confirmed that it will be based in Houston, Texas together with its existing PSA operation. The location could prove a rich hunting ground for the new venture with more than 50 new projects being announced and several companies already having established facilities in Houston.

Chemical companies, requiring "reasonable volumes of reasonable purity" could make significant cost savings by converting to non-cryogenic gas supplies and/or having an on site generator, a BOC spokesman said. Under the present system, most take deliveries of gas in liquid form which is easier to transport and store, and then have to vaporize it as and when required.

JAYSHREE CHEMICALS

Jayshree Chemicals has reported net sales of Rs. 4.52 crores for the six-month period ended March, 1988, as against Rs. 3.40 crores in the corresponding period in the previous year. It has however, incurred a gross loss of Rs. 43 lakhs against a loss of Rs. 67 lakhs. After depreciation of Rs. 34 lakhs (Rs. 27 lakhs), there is a net loss of Rs. 77 lakhs against the loss of Rs. 94 lakhs.

In the European Market

Naphtha prices continued to recover after their post-Opec slide. Levels are currently around \$163-165/ton cif and traders say these could move up.

Ethylene supply in NWE remains very tight and with no prompt material available, prices are steady at around \$460-480/ton cif. Some sellers report that "significantly higher" numbers could be obtained if product were available, but most reckon that prices are unlikely to edge much over \$500/ton cif with news that most crackers are now back on stream. Shell's unit at Berre is now back up after extensive delays and the Libyan cracker is also reported on stream. However, the US ethylene market is in turmoil after an explosion at Shell's Norco site which forced closure of the entire complex and declaration of force majeure on ethylene.

Propylene prices in NWE are steady at around DM620-640/ton cif, although with little material available, few deals have been concluded. With supply likely to improve as crackers restart, sources say there is little scope for further upward movement, although material has been heard on offer as high as DM650/ton fob.

Butadiene has continued to recover with some small deals reported done around \$305/ton fob. Producers are now looking to sell at levels above \$315/ton fob and traders believe prices could rise further on the back of tight supply. Prices have also firmed in the US where spot material is now in the range 17-18 cents/pound.

Benzene prices have now stabilized at \$315-325/ton fob after coming under downward pressure

from lower crude prices. The US market has not reached significantly to news of the Shell Norco explosion and spot prices are stable at \$1.00-1.04/gallon.

Toluene prices have risen slightly to \$260-265/ton fob, following a slide in the wake of the recent Opec meeting. However, demand is still lacklustre and traders say the rise is partly attributable to a recovery in US spot levels which now stand at 84-85 cents/gallon.

Solvent xylenes remain unchanged in a quiet market at \$285-290/ton fob although virgin grade has slipped back marginally to \$295-300/ton fob.

Orthoxylene prices have continued to lose ground in a very thin market and are now quoted in the range \$325-330/ton fob. However, paraxylene has remained steady at \$595-605/ton fob

and with strong demand from DMT and PTA producers, sellers are holding off for higher numbers.

Heavy buying has sent **styrene** prices rocketing to \$1,800-1,850/ton fob for T2 and T1 material. Deals were done around \$1,835/ton cif on T1 midweek and sellers are holding off for numbers closer to \$1,850/ton cif. Traders say that spot supply has dried up in NWE, and in the US where styrene is likely to be affected by the Norco incident, sellers are pressing for higher prices.

Methanol is steady at DM320-325/ton fob for T2 and \$165-170/ton cif for T1, but traders say material is now in very short supply following shipments from Rotterdam to the US. Most imports are contractual volumes and prompt T1 material is virtually unavailable.

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Plastic News from Abroad

NO SLOW DOWN YET FOR POLYOLEFIN PRICE HIKES

The tight supply demand positions in Europe's polyolefin markets have continued unabated during the past month, spurring a series of price rises in most grades of PE and PP.

In the polyethylene sector, producers are unable to meet demand and extruders in some countries are reported to have ceased production on some lines. Although there had been some hope that lower summer demand would enable a build up of inventories and ease the situation, producers say some customers are looking to maintain production in July and August in an attempt to cover order backlogs.

The recent problems in the ldPE market caused by shut-downs at Repsol and DSM have been made worse by stoppages at Shell's Berre plant. Shell's cracker has been down for maintenance but problems were encountered bringing it back on stream and the company has declared force majeure on ldPE supplies. Although the cracker is now running, it is unlikely that Shell will be supplying PE from there until June.

May prices appear to have stabilized at DM1.95-2.00/kg but this is expected to move up to DM1.98-2.05/kg, or even a little higher for June. For spot material, however, prices have continued to climb. Little ldPE is available but levels are reported to have moved from \$1,360/ton fob Rotterdam to over \$1,400/ton. Chinese buyers are rumoured to be prepared to pay up to \$1,450/ton and UK free delivered spot is up £20/ton from April at £760/ton.

DSM originally hoped to be back in full production at Geleen by the end of May, but it seems this may be delayed until early June.

For hdPE, the situation remains difficult. Producers say they are operating at full stretch but many customers remain on allocation with some unable to secure supplies. Pricewise, the position is mixed. Some producers are pushing up prices across the board by around 5 pfennig/kg. for May and expect a similar rise for June. Others are stabilizing prices this month although they reckon a small increase will be pushed through next month.

Small buyers complain that they are suffering regular price hikes and quote prices for 20 ton lots of injection moulding and blow moulding grades of between DM2.20-2.40/kg.

Demand for lldPE remains very strong and price levels for butene-based film grade remain firm at DM1.95-2.00/kg. Octene-based grades, however, seem to have reached higher than expected levels with general purpose material now in the DM2.05-2.35/kg. range. A further rise of 20-25 pfennig/kg is anticipated for Q3.

Polypropylene prices remain firm with levels at the lower end of the range moving up 2-5 pfennig/kg. Injection moulding grades have moved up 5 pfennig/kg to DM1.95-2.15/kg.

Supply remains extremely tight and with a number of scheduled maintenance shutdowns expected, this situation is unlikely to ease before the end of the summer. During this quarter, one of Himont's Italian units has been down for maintenance

and an ICI unit has been closed for maintenance. Problems have also affected production at Shell's Berre plant. Producers say demand is currently growing at a "staggering 13-15 per cent/year.

In spite of continued strong demand for polystyrene coupled with a spate of problems on monomer supplies, PS producers have so far resisted the urge to increase prices and are consolidating levels set in March.

Prices for large consumers on general purpose material are steady at DM2.45-2.55/kg, with high impact grade some 10 pfennig/kg ahead at DM2.55-2.65/kg. Medium sized consumers can expect to pay a 5 pfennig/kg. premium on these levels. In the UK prices remain at £830-840/ton for general purpose with high impact at £865-875/ton.

Producers are not expecting to announce any further increases on PS before the summer despite higher styrene costs, although those not backward integrated to ethylene are looking with interest to Q2 ethylene settlements. These prices are expected to increase by at least DM25/ton and could be a major factor in deciding price initiatives in the third quarter.

Short term supply of PS remains very tight and a number of producers have put consumers on allocation in the wake of monomer supply interruptions which have had repercussions on PS production. Cdf Chimie Norso-lor has been hit by selective strikes by CGT chemicals workers at its Carling styrene unit in France and the company was forced to declare force majeure on PS. Monomer supply has also been hit at Montedipe's Montova unit

After a flare stack went down, pushing it onto the spot market to obtain styrene for its PS plants at Feluy in Belgium. Meanwhile Dow has had problems at its PS unit in Belgium.

With PS demand still growing at around 4 per cent/year, producers say that the market will tighten in the short term on the back of these problems.

Stocks are still very low at under 3 weeks and lead times are quoted as long as 8 weeks on new orders with some producers unable to take new business on before July. However, hopes are that when units come back on stream and with the seasonal lull in demand over the summer, the market may ease.

Longer term supply should also improve with CdF confirming plans to build a new 50,000 ton/year unit at Carling. Atochem has 55,000 ton/year due on stream next June at Stalybridge in the UK whilst Huntsman has confirmed a 50,000 ton expansion at Carrington also in the UK. Meanwhile, expansion by Montefina in Belgium will add 40,000 ton/year by 1998.

Strong demand from the Far East is continuing to divert material from Europe. Traders report that cif numbers in excess of \$1,700/ton are achievable in small parcels to the Far East. In addition, PS supplies from Petrokemya's new unit in Saudi Arabia have yet to be seen in Far Eastern markets.

In the PVC business, prices are holding steady after last month's increase in paste grade was successfully implemented. Prices have now stabilized at DM2.30-2.50/kg and £750-770/ton in the UK, levels which are expected to hold until the end of

the year. Producers were not ruling out the prospect of an increase in pipe grade material last month on the back of increasing VCM costs and prices have edged up marginally to DM1.65-1.70/kg and £550-570/ton in the UK. Further price initiatives are not now expected before the summer.

The PVC market remains tight, and although availability varies considerably with grade, most consumers are still on allocation with producer stocks reported below three weeks. Producers are treating the prospect of further hikes with a degree of caution at the moment, and with the pros-

pect of increased supply next year, they are keen to hold onto existing business.

Production is reported to be running without problem at the moment, although Shell has had to cut back on PVC production at Berre because of its ethylene supply problems.

Meanwhile, strong Far East demand is still removing PVC supply, although traders report that movement is reducing as producers hang onto product for the domestic market. As a result, export levels are firming and prices in excess of \$1,100/ton fob are being asked for small export parcels to the Far East.

Plastics price report (DM/Kg)

| Product | Market Price | |
|--|--------------|-----------|
| | April | May |
| High density polyethylene (hdPE) | | |
| Injection moulding | 1.90-2.00 | 1.95-2.05 |
| Film (extrusion) grade | 1.95-2.10 | 2.00-2.15 |
| Blow moulding | 1.95-2.05 | 2.00-2.10 |
| Linear low density polyethylene (lldPE) | | |
| Film grade (butene-based) | 1.95-2.00 | 1.95-2.00 |
| Low density polyethylene (ldPE) | | |
| Film grade | 1.95-2.00 | 1.95-2.00 |
| Polypropylene (PP) | | |
| Raffia grade | 1.75-1.85 | 1.77-1.85 |
| Injection moulding | 1.90-2.10 | 1.95-2.15 |
| Copolymer | 2.00-2.30 | 2.02-2.30 |
| Polystyrene (PS) | | |
| General purpose | 2.45-2.55 | 2.45-2.55 |
| High impact | 2.55-2.65 | 2.55-2.65 |
| Polyvinyl chloride (PVC) | | |
| Pipe grade | 1.60-1.65 | 1.63-1.70 |
| Paste grade | 2.30-2.50 | 2.30-2.50 |

The left hand column gives a guide to price levels for large-to-medium size buyers and for general-purpose grades in April. The right hand column shows the latest prices in May.

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July 5, 1988

Chemical Markets Abroad

PLANNED ETHYLENE HIKES WILL COVER US DEMAND

US ethylene demand is projected to grow at an average annual rate of 2.5 per cent over the next five years to top 18m ton/year by 1992 according to Robert Lavach, a senior consultant at SRI International of the US.

Speaking at the recent CMRA meeting in New York, Lavach said that given this anticipated growth rate, additional US ethylene capacity will be required before 1990, although planned new crackers, capacity additions, plant restarts and capacity creep during maintenance work will cover the increase in demand.

Lavach estimates current US ethylene capacity at 16.1m ton, operated by 21 producers, (see accompanying table). Capacity is somewhat lower than the 16.7m ton high of 1984 after a period of rationalization when several

producers shut down or mothballed older or less economical facilities. The latest NPRA figures show US production for the first quarter at 4.1m ton, 9.7 per cent ahead of the year-earlier period although the explosion at Shell's Norco site will seriously affect output figures for Q2.

Within the next two years, the consultant expects an increase of 500,000 ton to capacity, with a further 3m ton by 1992, bringing total capacity to 18.8m ton. Currently, at least nine producers are in the process of starting up, considering restarting or adding new ethylene capacity. These include Union Carbide and Texaco which have restarted mothballed units, and Quantum, which has approved plans for a 680,000 ton/year cracker at Deer Park, Texas. Lyondell is also seeking to expand.

Of the new units planned, Phillips Petroleum is currently awaiting board approval to build a

590,000 ton/year cracker at Sweeny on the Gulf Coast. Dow is considering a 445,000 ton/year unit at Freeport, Texas. Formosa is also considering a 455,000 ton/year plant in Texas, although Lavach believes it is using the threat of the unit as a lever to solve a political squabble in Taiwan.

In addition, a number of expansions have been announced. As well as Union Carbide and Texaco, Exxon is expanding its plants in Texas and Louisiana over the next five years adding 265,000 ton to capacity while Shell is considering restarting its 545,000 ton/year unit at Deer Park. Engineering studies are underway at the site, although given a price tag of \$135m, Lavach gives the plant only "a 30 per cent chance" of it coming on stream within the next few years.

Taken together, the SRI executive reckons the additions could add around 3.5m ton to capacity in the US by 1993, although

(Contd. on p. 101)

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Biotechnology

DENMARK & FRANCE APPROVE GENE-SPICED hGH PRODUCTS

Nordisk Gentofte, the Danish insulin group, has received a double boost for its genetically engineered human growth hormone ambitions. The Danish health board has granted the drugs company permission to market **Norditropin**. Also the firm has now been given the green light to produce the hormone in Denmark after the appeal court upheld an approval granted about three years ago.

The company is the first Danish pharmaceutical firm to receive approval for a biotechnology-derived drug. Also Nordisk is the first Danish firm to win approval for a drug under the new European community regulations which provide parallel approval for high technology biosynthetic products in all member states.

National approvals are expected to be issued by other EEC member states in the very near future. "We expect the market for human growth hormone to be worth more than \$1bn within the next few years and we hope to capture 20 to 25 per cent of that market," said Kurt Stenager, executive vice president. Nordisk is predicting **Norditropin** sales to exceed Dkr200m (\$31m) in the current financial year.

Nevertheless, Nordisk will have to compete with the Eli Lilly and KabiVitrum products that are already in the marketplace. The company has also missed out on the orphan drug status in the US, the largest market for human

growth hormone. Ares Serono is hoping to win approval from the Italian authorities for the Cell tech product within the next few months.

Moreover, Sanofi, the French drugs firm has won approval from the French authorities to market its own human growth hormone. France is also considering applications from the other firms in the market. Gene-spliced growth hormone will only be available through hospitals.

Human growth hormone derived from pituitary glands represents about 20 per cent of Nordisk's sales. Nordisk has seen about 10 per cent growth in its European market share but has failed to make any major impact in Japan or the US. The Danish firm is believed to have been in negotiations with US drug firms in an attempt to gain a foothold in the market.

Nordisk, according to Stenager, is now ready to manufacture the gene-spliced hGH. The company also has ambitions to manufacture insulin and factor VIII products using biotechnology techniques. "We expect to file for approvals in the near future and manufacturing facilities are now being established."

The court of appeal judgement will be welcome news for Novo. The Danish firm has already had its approval to manufacture gene-spliced insulin blocked and it is hoping to manufacture other biotechnology products including its new fat digesting detergent enzyme **Lipolase**, at its Kalundborg site.

It is expected that subsequent appeals against biotechnology manufacturing approvals will be faster than the Nordisk case which took 32 months in the appeal court. Novo is anxious to reverse its trend of losing insulin market share to Eli Lilly. Novo's share of the market has slipped from 36 per cent to 34 per cent.

In the detergent enzymes market Novo has benefited from the higher consumption in the US market. But the company has high hopes for **Lipolase** which could be yielding sales in excess of \$150m/year by 1992.

CANADIANS DEVELOP PCB METHOD

Canada's national research council (NRC) is seeking an industrial partner to help develop a chemical method for rendering polychlorinated biphenyls (PCBs) harmless during transportation and disposal. The chemicals are known to cause cancer. The new method would remove the need to burn PCB-containing wastes at temperatures above 1,200°C.

The Canadian researchers have found a way to strip out chlorine from the PCBs and replace it with hydrogen using cheap chemicals at room temperature. The PCBs are treated with an alkali metal and polymethylsiloxane which acts as a hydrogen donor.

But, according to one of the researchers, Dr. Derek McPhee, the team does not have the resources nor the mandate to develop the process for commercial use. "The NRC is now looking for an industrial partner to take the patented process and test it for industrial applications," he

said. The NRC has already received a number of enquiries from US and Canadian firms.

Using the process PCBs can be treated, McPhee adds. The by-products, which do not include dioxins or benzofurans can be transported from the storage site to an incinerator and burned at room temperature with no risks to the environment. Similar existing processes remove only 90 per cent of the chlorine from PCBs.

NOVO BIDS \$23.2m FOR ZYMOGENETICS

Novo, the Danish insulin and enzymes maker, has announced a \$23.2m bid to take control of Zymogenetics, the Seattle, Washington-based bioscience company. A letter of intent has been approved by the boards of both companies and the acquisition is expected to be completed next month.

The firms have been collaborating for the past six years since Novo acquired a 16 per cent stake in the US firm. Zymogenetics has played a key role in the development of Novo's gene-spliced human insulin and human blood factor VIII products. Through the acquisition Novo will obtain a biotechnology research and development position in the US and increase its potential in the blood products portfolio.

Novo has reported sales and pretax income increases for the first quarter of 1988 of 6 per cent and 23 per cent respectively over the corresponding period last year. Some large shipments of insulin and increased sales of enzymes to the US starch indus-

try contributed to the strong first quarter claims the company.

Net turnover for the quarter was DKr1.28bn (\$200m) compared with DKr1.21bn in 1987. Pretax earnings soared to DKr233m from the previous years DKr190m but Novo warns the first quarter results should not be considered as indicative for the 1988 performance.

Pharmaceutical sales rose 11 per cent in the quarter from DKr618m while sales in the biotechnology group increased 9 per cent from DKr419m to DKr455m.

US DRUG FIRMS BOOST RESEARCH BUDGETS

US pharmaceutical majors Schering-Plough and Merck Sharp & Dohme are earmarking more funds for drug research and development this year. Merck is committing \$650m to R&D while Schering-Plough is boosting its research spending by 18 per cent to \$300m.

Merck is committed to a strategy of developing new products to more than offset falling returns from older drugs, according to Dr. Roy Vagelos, chairman and chief executive officer. But Merck is also emphasizing other means of acquiring products such as licensing, acquisition and joint venture deals.

In addition to focussing on R&D, Schering-Plough also plans to emphasize aggressive marketing techniques and growth through mergers and acquisitions. Schering-Plough is poised to receive the green light from the US food and drug administration for its non-sedative antihistamine

Claritin. This drug could be worth up to \$300m/year, claims company chairman and ceo Robert Luciano.

US MULLS STREAMLINING OF GENE RELEASE ROLES

The US needs to update its laws regulating the release into the environment of genetically engineered organisms, according to a report from the US Congress office of technology assessment (OTA). The OTA is proposing that the current regulatory system be streamlined. It is likely to be overburdened as more products emerge. To date gene-spliced organisms have been field tested about 24 times in at least 12 states and four foreign countries.

Currently bodies such as the environmental protection agency (EPA) and the US department of agriculture, review proposed releases on a case by case basis. The Biotechnology science coordinating committee (BSCC) oversees this patchwork of regulations.

Congress has been pressing for BSCC to be given more teeth but the OTA is now proposing that a new coordinating body be established with the muscle to harmonize criteria for field tests. OTA is also suggesting cutting the number of reviews by selecting only those organisms containing pathogen-derived genes or those which pose a specific threat to the environment.

Risk assessment during field tests would be improved through better tracking of gene-spliced organisms in the environment,

argues the QTA. The Congress group suggests that creation of a task force or an increase in research funds be useful.

Commenting on the report James H. Scheuer, chairman of the committee on science, space and technology said: "Commercialization of biotechnology has been hindered by a fear of the potential consequences of releasing genetically engineered organisms into the environment. The OTA report provides the type of comprehensive, thoughtful, scientific review of this issue that has been sorely lacking. It gives us reassurance that we know enough to move ahead in bringing the benefits of biotechnology to the world and to protect the environment at the same time."

KOREAN FIRM TO EXPORT AIDS DRUG

Wellcome, that UK drugs group, is monitoring carefully the activities of South Korea's Samchully Pharmaceutical. The South Korean firm has just gained government permission to begin mass production and export of azidothymidine, the active ingredient of the Aids respite, at cut rate prices.

Samchully Pharmaceutical is planning to export the drug at about half the international prices of \$155 for 100mg. While the company plans to start exporting \$10m worth of the drug to the US and Western Europe by next month it will not be allowed to start domestic sales until clinical tests have been completed.

Officials at Wellcome are aware of the plant but are sceptical of the South Korean firm's claims that it has developed a

cheaper manufacturing route for the drug. "Reports of the process have not been validated and we believe they have only achieved pilot scale production," a spokesman said.

Wellcome, the spokesman added, is committing much of its research and development to the fine tuning of zidovudine manufacture. "We would expect to be at the forefront of technology in this area."

It is not clear how Samchully Pharmaceutical will be able to sell its AZT product in the US and Europe. Wellcome already has use patents for zidovudine in the US and has filed for similar patents in other leading markets. Whether Wellcome will take legal action against the South Korean firm "remains to be seen."

BIOTECH SKILLS SHORTAGE LOOMS

Cuts in UK government research spending could have a detrimental effect on the developing biotechnology sector, warns Richard Pearson, deputy director of the Institute of manpower services. Speaking at the Biotech 1988 conference in London recently he warned that unless the throughput of doctoral and post doctoral graduates is increased shortage will constrain the development of biotechnology in the next decade.

Demand for professional biotechnology staff in the UK will rise by 10 to 15 per cent/year, Pearson predicts. Greatest growth is expected in plant molecular biology, in downstream processing, protein engineering and biochemical engineering.

"If demand continues to expand at the expected rate then selective skill shortages are likely to intensify, especially for experienced people in plant molecular biology and in key specialisms within bioprocessing", Pearson warned delegates.

Furthermore, recruits may be attracted abroad, he warned.

BELGIAN GREENS CALL FOR EIB LOANS

Belgian environmental activists are calling on individual companies and national, regional and local authorities to apply to the European investment bank to fund environmental projects. The EIB loaned Belgium Ecu 46m (\$56m) in 1986 and Ecu 37m in 1987 but none of this was used for environment.

Entente Europeenne pour l'Environnement (EEE) argues that Belgium needs a new policy in favour of long term productive investment which is dependent on both the EIB and on the integration of environmental concerns into its national system of credit.

BYK-GULDEN BUYS UNIT

Mallinckrodt, the International Minerals & Chemicals subsidiary has sold the in vitro portion of its European diagnostics business, based in West Germany, to Byk-Gulden Lemberg Chemische Fabrik of Konstanz, West Germany. Terms of the sale have not been disclosed.

The US speciality chemicals and medical products firm announced last January its intention to sell this diagnostics business. Mallinckrodt expects the sale of Byk-Gulden to be competed by the end of June.

Contd. from p. 97)

he concedes the number is more likely to be closer to 2.5m ton, citing the cost of restarting old facilities as a potential barrier. A simple calculation, Lavach sta-

tes, puts the cost in the order of \$240-285/ton which amortized over three years, would add 4-5 per cent to the cost of ethylene.

Assuming ethylene prices continue their upward movement, La-

vach notes that the cost increase might not be so much of a burden. However the spectre of new capacity "could be the spark to force prices down and make some expansions impractical."

US ethylene Producers

| Company | Location | Capacity (000 ton) | Planned Capacity additions* (000 ton) | |
|------------------|--------------------|-----------------------|---|---------|
| | | | 1988-90 | 1991-93 |
| Amoco | Alvin, TX | 975 | | |
| B.F. Goodrich | Calvert City, KY | 165 | | |
| Cain | Alvin, TX | 450 | | |
| | Corpus Christi, TX | 545 | | |
| Chevron | Cedar Bayou, TX | 545 | | |
| | Port Arthur, TX | 430 | 45 | |
| Dow | Freeport, TX | 840 | | 455 |
| | Plaquemine, LA | 880 | | |
| Du Pont | Orange, TX | 420 | | |
| El Paso | Odessa, TX | 235 | | |
| Exxon | Baton Rouge, LA | 640 | 30 | 275 |
| | Baytown, TX | 640 | 90 | |
| | Gulf Coast | | | 455 |
| Formosa | Corpus Christi, TX | 10 | | |
| Koch | Channelview, TX | 1270 | | |
| Lyondell | Beaumont, TX | 475 | | |
| Mobil | Houston, TX | 230 | | |
| | Lake Charles, LA | 230 | | |
| Occidental | Sweeny, TX | 1180 | | 590 |
| Phillips | Deer Park, TX | 815 | | 545 |
| Shell | Norco, LA | 1020 | | |
| | Claymont, DE | 100 | | |
| Sun | Port Arthur, TX | 475 | | |
| Texaco | Port Neches | | 160 | |
| | Longview, TX | 610 | | |
| Texas Eastman | Clinton, IA | 365 | | |
| USI/Quantum | Morris, IL | 425 | | |
| | Tuscola, IL | 180 | | |
| | Deer Park, TX | | | 680 |
| Union Carbide | Seadrift, TX | 375 | | |
| | Taft, LA | 335 | 205 | |
| | Texas City, TX | 570 | | |
| Union TX/BASF/BW | Geismar, LA | 350 | | |
| Vista | Lake Charles, LA | 295 | | |
| Total | | 16075 | 500 | 3000 |

*Not all capacity is expected to be built

Source: SRI International

News About New Projects

DOW IN IHDPE, MDI PLANS, CONFIRMS STADE INVESTMENT

Dow Chemical Europe has announced plans to build a major new linear low density polyethylene plant in Spain. The company has also revealed that it is studying a new methane diisocyanate (MDI) facility in Europe and has confirmed plans to spend around DM1bn (\$594.3m) on its Stade, West Germany, complex in the next five years.

The initial design plans have already been approved for a new Dowlex IIdPE plant at Tarragona, Spain, at Dow's existing manufacturing site.

The plant will be operational in the first quarter of 1991 with a planned production capacity of 150,000 ton/year. The contract has not yet been awarded.

Dow currently produces Dowlex polyethylene at two of its manufacturing sites in Europe — at Tarragona and Terneuzen in the Netherlands.

The Terneuzen facility is currently being doubled in size to 220,000 ton/year for completion in the second quarter of this year. Its existing Dowlex unit at Tarragona has a 50,000 ton/year capacity. On completion of the new Spanish plant, Dow's total European production capacity of

Dowlex will be raised to 500,000 ton/year.

The 80,000 ton/year balance will be obtained through debottlenecking of the existing units both at Terneuzen and Tarragona, the company says.

Dow has 340,000 ton/year of ethylene capacity at Tarragona and currently uses in the region of 220-230,000 ton/year in its low density polyethylene and linear low density polyethylene speciality production. The balance is sold to a number of local consumers, including Aiscondel, Iqa, Hoechst and Viniclor, which will need to find alternative supply sources.

Reports that Dow is to spend DM1bn on its Stade facility in West Germany are linked to projections for capital spendings on the site during 1988-1992. An investment programme of this magnitude was indicated in documents filed with the state government of Lower Saxony to show Dow's likely requirements for investment incentives.

At present the Stade facility produces propylene oxide and ethylene dichloride. Both propylene and ethylene are imported to the site. Suggestions that a new ethylene plant would be built at Stade have been denied.

A polycarbonates facility which the company plans in northern Europe could be located at the German site. The project forms part of a \$200m investment announced last year, which also includes an ABS unit (at Terneuzen) and a polyethylene thermoplastic resin Tyrin facility (at Stade).

Likewise a new MDI facility which the company confirms it is planning in Europe could be built at Stade.

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Dow says it is close to a decision on 60-70,000 ton/year plant, possibly at Stade or at its existing MDI site in Portugal or the Netherlands. Such a unit would cost \$80-100m.

The company's total MDI capacity is 50,000 ton and it is looking at opportunities to de-bottleneck existing plant.

Propylene (PO), another leg of the polyurethanes business, is produced by Dow to the tune of 20,000 ton but this could be expanded to 500,000 ton, according to specialty urethanes business manager, Peter Phillips.

The PO is used to make polyols, produced by Dow at Terneuzen and Tarragona. A possible substantial hike in polyols capacity is slated for Terneuzen.

ARISTECH TO BUILD PHENOL PLANT

Aristech Chemical Corp of the US, one of the country's largest producers of phenol, is going ahead with plans to build a grassroots cumene/phenol complex. The company has begun phase 1

engineering for the project and MW Kellogg has been awarded the contract.

The plans involved the construction of a 230,000-270,000 ton/year phenol plant and an associated cumene feedstock unit.

Aristech currently operates a 290,000 ton/year phenol plant at Haverhill, Ohio and production from the proposed new facility will reinforce its leadership role in this market, according to Craig Andersson, president and chief operating officer of the company.

"Intermediate and end use markets for phenol continue to grow with applications in housing, transportation and a wide range of other industrial and consumer products", he said.

"Phenol has been in short supply worldwide for a number of years, and we anticipate continued growth will provide a ready market for the output from our proposed new facility".

Aristech is still considering a number of sites for the cumene/phenol complex, but Anderson indicated it would be somewhere

on the Gulf Coast to enable ready access to raw material supplies, as well as to deep water ports for export shipments. The plant could be on stream by the first quarter of 1991.

PERU TO BUILD PS, PLANS HDPE PLANTS

The Companies Consorcio Industrial del Acero — Cidasa — and Unipetro have decided jointly to construct a 15,000 ton/year suspension polystyrene plant in Callao, near Lima, Peru. The plant will initially produce 6,000 ton/year of high impact, 5,000 ton/year general purpose and 1,200 ton/year of expanded polystyrene.

Around 7,000 ton/year of the output will be destined for the local market and the rest for export to Ecuador, Colombia and Chile.

The project is being financed by the Interamerican Development Bank, Banco Industrial Del Peru and by di Casa and Unipetro. Monomer sourcing will be from Argentina, Brazil and the US Gulf Coast.

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Caliron Synth-Chem (P) Ltd., LUDHIANA.

The \$6m project, the first PS plant in Peru, is due on stream 1989. All the equipment will be purchased in West Germany.

Both companies are currently preparing preliminary studies for the construction of a high density polyethylene plant in the south of Peru, based on gas recently discovered by Shell Petroleum.

SANTA FE BRAUN NOT FOR SALE

Reports that Kobe Steel of Japan is to acquire the US-based engineering contractor Sante Fe Braun from its present owners Kuwait Petroleum Corp (KPC), have been denied.

"We have had discussions with Kobe Steel and other companies in respect of our engineering company Sante Fe Braun but the talks have broken off", said Boyd Hight, chief executive of Sante Fe Braun International.

"We are not talking to anyone and the company is not up for sale, we will stay in the engineering business and in Kuwaiti ownership," he stressed.

Kobe undertook an extensive pre-acquisition study of Sante Fe Braun and was particularly attrac-

ted to the US-group's ammonia technology.

TECHNIP TO FORM VENTURE IN USSR

Final negotiations are under way between the French contractor Technip and the Soviet ministry of oil refining and petrochemicals to form an engineering joint venture, according to Alexei Litvinenko, of the external affairs department at the ministry.

Technip declined to reveal details about the plans, but it is thought that the joint venture would be formed to carry out specific expansion work. This could involve the revamping of the Ufa and Omsk refineries and aromatics complexes. The agreement is due to be signed before the summer break.

HUNTSMAN GIVES GO AHEAD FOR PS PROJECT IN UK

Huntsman Chemical is going ahead with its previously announced polystyrene expansion at Carrington in the UK.

Although the company has not yet announced the contract award, it is understood that the US contractor Lummus Crest has been selected to carry out the

work. Lummus Crest has a general agreement to promote Huntsman's polystyrene technology and this would be its first PS project for the US firm.

Len Clark, managing director of Huntsman Chemical UK, has confirmed that plans to build a 50,000 ton/year high impact PS facility at Carrington are moving ahead and that the company has already placed orders for key equipment items. The £11m project is planned on stream by the second quarter of 1989.

Huntsman's existing 25,000 ton/year ex-Shell plant at Carrington produces high impact and crystal PS. Product will be sold on the European markets, including Scandinavia.

There appears to be some uncertainty regarding future supplies of styrene monomer. At present the company buys the feedstock from suppliers such as Shell and BP. The new plant will require an extra 50,000 ton/year of the feedstock which should come from the new 400,000 ton/year Huntsman-Mitsubishi joint venture plant at Baton Rouge, Louisiana, also due on stream in the second quarter of 1989, provided ethylene feed can be secured.

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Magnesium Hydroxide N.F./B.P.C./U.S.P./PASTE

Magaldrate U.S.P.

Magnesium Aluminium Silicate

Please Contact Manufacturers :—

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Phone: O. 26479, 26020 — Resl.: 26988

Factory : 94/5, Chitra Industrial Estate, Chitra, Bhavnagar-364 004.

Phone: F. 5187/5061



MARKET INFORMATION

Restricted Trading

The Bombay Chemicals market witnessed restricted trading in major items owing to shortage of ready goods and high prices.

Caustic soda and soda ash which were in limelight in the beginning of

the week continued towards the later part also.

DEG, cyclohexanone and MEK are in acute shortage. Dyes intermediates, MNA and MPD are short supply through the dyes exports are doing well,

but due to certain shortage of intermediates has affected.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent — and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on 22nd June 1988)

| INDUSTRIAL CHEMICALS | Per kg | | | | |
|---------------------------|--------|----------------------------------|------------|--------------------------------|---------|
| Ammonium sulphate | 2.00 | Borax (Granular) | 13.50 | Calcium Carbonate PPT | 3.00 |
| Ammonium phosphate (Mono) | 14.50 | Borax (Powder) | 20.00 | Calcium carbonate (Activated) | 3.55 |
| Ammonium phosphate (Di) | 12.00 | Boric acid (Tech.) | 21.00 | Camphor (Indian) | 82.00 |
| Ammonium carbonate (Di) | 17.00 | Bisphenol-A | 56 + 57 ST | Cresylic acid | 50.00 |
| Ammonium bicarbonate | 4.75 | Butyl carbitol | 48.00 | Cream of Tartar (Tech.) | 70.00 |
| Ammonium chloride | 3.40 | Caustic soda (Flakes) | 9.20 | Citric acid (Belgium) (Resale) | 43.00 |
| Ammonium nitrate | 3.50 | Caustic soda (Solid) | 8.00 | Citric acid (Indian) (Resale) | 42.50 |
| Arsenic white powder | 21.00 | Caustic soda (Lye) | 7.00 | Copper sulphate | 17.50 |
| Acrylamide (Resale) | 57.00 | Calcium chloride 70% (solid) | 3.25 | Chromic acid | 48.00 |
| Barium carbonate | 6.00 | Calcium chloride 75-80% (fused) | 3.50 | Cyanuric chloride | 120.00 |
| Bleaching powder (33% Cl) | 4.00 | Calcium chloride 36% (Anhydrous) | 5.00 | Cobalt oxide | 280.00 |
| | | | | Carbitol | 55 + ST |

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Telex : 041-6503 RAM IN

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| | | | | | |
|--------------------------------|-------------------|--------------------------------|-----------------|----------------------------|----------------|
| Dicalcium phosphate | | Sodium sulphate (Fine) | 8.00 | Butyl stearate | 36.00 |
| Ethylene urea | 58.00 | Sodium sulphate (Coarse) | 5.00 | Butanol | (Resale) 34.00 |
| Ferric chloride (Lumps) | 7.00 | Sodium sulphide 50-52% | | Benzyl Alcohol | 60.00 |
| (Anhydrous) | 16.00 | (Flakes) | 8.00 | Benzyl chloride | 34.00 |
| Glue flakes | 8.45 | Sodium sulphide 58-60% | | Benzo trichloride | 16.00 |
| Glue sheets | 6.75 | (Flakes) (TCL) | 21.00 | Benzoyl chloride | 22.00 |
| Gohsenol GH-17 | 125.00 | Sodium sulphide pure (Flakes) | 12.25 | Bromine Liquid | 42.50 |
| Hydro | (Resale) 41.50+ST | Sodium nitrite | (Resale) 800.00 | Chloroform | 25.00 |
| Hyflosupercell | 19+ST | Sodium chlorite 80% (Spain) | 94.00 | Carbon Tetrachloride | 15.50 |
| Hexamine | (Resale) 35.00 | Santobrite (Indian) | 36.00 | Cellosolve | 45+ST |
| Industrial Wax | 25.00 | Soda Ash (Tata) | 4.00 | Cyclohexanone | 55+ST |
| Litharge | 15.00 | Soda Ash (Birla) | 3.80 | Cyclohexanol | 43+ST |
| Lead Acetate (Tech) | 28.00 | Soda Ash (Imp.) | 3.50 | Diacetone | (Resale) 35.00 |
| Lithopone | 15.50+ST | Sodium bicarbonate | 5.25 | Diethyl Oxalate | 34.00 |
| Magnesium chloride (Crystal) | 1.00 | Sodium bisulphite | 4.50 | Diethylene glycol (DEG) | 40+ST |
| Menthol crystal (Flakes) | 185+Ex.+ST | Sodium silicate | 3.00 | Diethyl Phthalate | 52.00 |
| Menthol bold | 205+Ex.+ST | Sodium acetate | 6.00 | Diallyl Phthalate | 56.00 |
| Menthol crystal bold | 245+Ex.+ST | Sodium alginate | 140+ST | Dimethyl Phthalate | 28.00 |
| Magnesium carbonate (Japan) | 16.00 | Titanium Dioxide (Anatase) | 50+ST | Diethyl Adipate | 52.00 |
| Magnesium carbonate (Indian) | 15.00 | Titanium Dioxide | | Dibutyl Adipate | 42.00 |
| Maleic Anhydride (per kg) | | (Rutile — RCR ₂) | 69+ST | Dipentene | 15.00 |
| (Resale) | 48+ST | Tartaric acid (Crystal) | 94.00 | Dimethylamine 40% | 12.00 |
| Mercury (75 lbs.) | 10,000.00 | Trisodium phosphate | 4.80 | Dimethylamine 60% | 14.00 |
| Nickel chloride | 90.00 | Thiourea | 72+ST | Ethyl Acetate | 22.00 |
| Oxalic acid | (Resale) 24.00 | Urea (Tech) | 2.75 | Ethyl Acrylate | 49.00 |
| Peppermint oil (Rectified) | 90+Ex.+ST | Vacuum salt | 1.00 | Ethylene Dichloride | 11.00 |
| Potassium carbonate (Indian) | 19.00 | Zinc Dust | 30.00 | Ethylene Glycol | 31+ST |
| Potassium carbonate (Imported) | 21.00 | Zinc Oxide | 30.00 | Formic Acid (Imp) | (Resale) 29.00 |
| Potassium bichromate | 22.00 | Zinc chloride powder | | Formaldehyde | (Resale) 7.00 |
| Potassium phosphate (Mono) | 14.00 | (technical) | 14.00 | Glycerine (CP) | 53.00 |
| Potassium phosphate (Di) | 14.00 | Zinc sulphate | 4.00 | Glycerine (IW) | 48.00 |
| Polyvinyl alcohol (No. 117) | 115.00 | | | Hydrogen peroxide 50% | |
| Polyvinyl alcohol (No. 173) | | SOLVENTS | Per kg. | (Resale) | 29.00 |
| (Resale) | 120.00 | Acetic Acid (Glacial) (Resale) | 14.00 | Isopropyl Alcohol | 17.50 |
| Polyvinyl alcohol (No. 208) | 115.00 | Acetic Anhydride (Resale) | 24.00 | Iso Butyl Alcohol | 28.00 |
| Paraformaldehyde (Resale) | 19+ST | Acetone (Resale) | 15.00 | (Resale) | 30.00 |
| Phthalic anhydride 36% | | Adipic Acid | 54+ST | Monoethanolamine (Resale) | 49.00 |
| (Resale) | 24.00 | Aceto Acetanilide | 50.00 | Melamine | 52+ST |
| Pentaerythritol (Resale) | 51.00 | Aniline Oil (Resale) | 50.00 | Methyl Ethyl Ketone | 53.00 |
| Paraffin wax (Resale) | 14.50 | Benzoate Plasticiser | 45.00 | Methyl Isobutyl Ketone | 36.00 |
| Rangolite (German) | 80+ST | Butyl acrylate | 85+ST | Methyl Acrylate | 42.00 |
| Rangolite (Czech.) | 54+ST | | | Methyl Dichloride (Resale) | 23.00 |

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| | |
|----------------------------|------|
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| CHLORAMPHENICOL | I.P. |
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| PIPERAZINE HYDRATE/CITRATE | I.P. |

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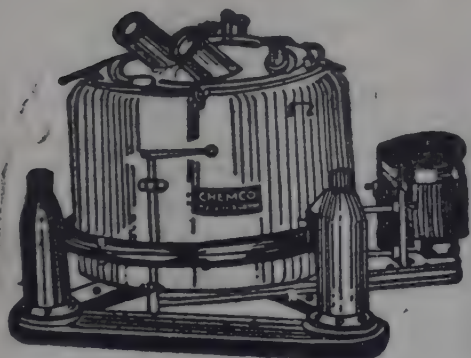
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| Ortho Cresol | 30+ST |
| Phenol (Resale) | 31.00 |
| Propylene Glycol | 36+ST |
| Polyethylene Glycol (No. 200) | 39.00 |
| Polyethylene Glycol (No. 400) | 42.00 |
| Polyethylene Glycol (No. 500) | 42.00 |
| Polyethylene Glycol (No. 1600) | 14.00 |
| Polyethylene Glycol (No. 4000) | 38.00 |
| Polyethylene Glycol (6000) | 50.00 |
| Para Cresol | 40.00 |
| Styrene monomer | 48+ST |
| Sorbitol | 18.50 |
| Sulphuric Acid | 2.10 |
| Trichloroethylene | 27.00 |
| Triethanolamine (Resale) | 49.00 |
| Turpentine Oil (Germany) | 8.00 |
| Turkey Red Oil (50%) | 11.75 |
| Triethylamine | 50.00 |
| Vinyl Acetate Monomer | 41.30 |

| SOLVENTS | Per Litre |
|-----------------------|-----------|
| Benzene | 11.50 |
| N-Heptane | 8.00 |
| N-Hexane | 8.75 |
| Methanol | 8.00 |
| Solvent Naphtha Heavy | 10.50 |
| Solvent Naphtha Light | 8.50 |
| Toluene | 12.50 |
| Xylene | 15.00 |

DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)

| | |
|------------------------------------|--------|
| Alphanaphthylamine | 60.00 |
| Alpha Naphthol (Imp.) | 180.00 |
| Aceto Acetic Ester (Methyl) | 60.00 |
| Ammonium Molybdate | 200.00 |
| Anthraquinone | 75.00 |
| Anthranilic Acid | 60.00 |
| 2-Amino-4-Nitrophenol (Imp.) | 130.00 |
| Blue B. Base (Local) | 230.00 |
| Beta Naphthol (Atul) | 58.00 |
| Benzidine Dihydrochloride (BDH) | 80.00 |
| Bromamine Acid | 375.00 |
| BON Acid | 110.00 |
| Chicago Acid | 280.00 |
| Coach Acid | 56.00 |
| C. Acid (Imp.) | 260.00 |
| Cyanuric Chloride (Japan) | 120.00 |
| 2, 4, DNCB | 26.00 |
| Dihydrothio PTOS (Imp.) | 600.00 |
| Dimethyl Aniline | 60.00 |
| Diethyl Aniline | 155.00 |
| Di-amino stilbene disulphonic acid | 120.00 |
| 3, 3-DCB (Imp.) | 180.00 |
| Gamma Acid (Atul) | 170.00 |
| H. Acid (Atul) | 155.00 |
| G. Salt | 60.00 |
| Isophthalic Acid | 40.00 |
| J. Acid | 255.00 |
| J. Acid Urea | 275.00 |
| K. Acid | 100.00 |
| MDPS (German) | 200.00 |
| MNA | 85.00 |

| | |
|--------------------------------|------------|
| Meta Unido Aniline | 145.00 |
| MPD (Local) | 130+Ex+Tax |
| MPD (Japan) | 200.00 |
| Naphthenic Acid | 12.00 |
| N-Methyl J. Acid | 380.00 |
| N-Methyl Aniline | 115.00 |
| Naphthalene (Refined) | 23.00 |
| Ortho Anisidine (OA Imp.) | 85.00 |
| Ortho Dichloro Benzene (ODCB) | 11.25 |
| OT Base | 95.00 |
| Para Dichloro Benzene (PDCB) | 16.00 |
| Para Anisidine (PA-Imp.) | 110.00 |
| Para Anisidine (PA-Local) | 90.00 |
| PNA | 70.00 |
| Para Cresidine (Imp.) | 325.00 |
| Para Amino Azo Benzene (India) | 125.00 |
| PNCB | 30.00 |
| Para Amino Acetanilide | 145.00 |
| 1-Phenyl 3-methyl-5 Pyrazolone | 120.00 |
| Phenyl J. Acid | 345.00 |
| Para Amino Benzoic Acid | 170.00 |
| PT Base | 88.00 |
| Rhoduline Acid | 500.00 |
| Resist Salt | 20.00 |
| Resorcinol | 145.00 |
| Sodium Naphthionate | 65.00 |
| 5-Sulpho-Anthranilic Acid | 62.00 |
| Sulphanilic Acid | 25.00 |
| Sulpho Tobias Acid | 113.00 |
| Trichloro Benzene (TCB) | 17.00 |
| Tobias Acid | 120.00 |

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(Prices as on 22nd June 1988)

[illegible]

| KROCHON COLOURS | | Per Kg. | | | |
|-----------------------|--------|------------------------------|----------------|------------------------------|--------|
| Golden Yellow HR | 181.80 | Navy Blue M 3R | 310.95 | Blue R Conc. Pdr. Fine | 577.65 |
| Brill. Yellow H4G | 117.85 | Brill. Blue MR | 331.70 | Blue RR Supra Powder | 629.35 |
| Supra Yellow H-8GP | 168.55 | Brill. Blue M RX | 214.20 | Blue Conc. Powder | 645.80 |
| Brill. Yellow HE6G | 166.95 | Brill. Blue M-G | 382.30 | Brill. Blue 2R Hly. Conc. | 378.55 |
| Yellow H-E4R | 276.05 | Blue M 4GD | 344.60 | Brill. Blue 2R Supra Disp. | 115.65 |
| Brill. Yellow H7G | 332.30 | Navy Blue M RB | 318.75 | Dark Blue 2R Powder Fine | 389.25 |
| Yellow M4R | 243.95 | Turquoise M-G | 197.85 | Blue BC Supra Disp. | 359.40 |
| Yellow M GR | 326.05 | Brill. Blue M GX | 302.50 | Jade Green XBN Powder Fine | 438.20 |
| Brill. Yellow M4G | 177.10 | Blue 3R Acra Powder | 718.20 | Jade Green XBN Acra | |
| Brill. Yellow M8G | 332.30 | Dark Brown H 6R | 248.45 | Conc. Powder | 823.90 |
| Yellow M 3R | 217.60 | Cobalt Oxide (per kg.) | 285.00 | Jade Green 2G Pdr. Fine | 419.65 |
| Brill. Orange H 2R | 241.85 | Green H 4BD | 269.80 | Jade Green 2G Ptg. Paste | 125.40 |
| Brill. Red H 7B | 157.95 | Green H-E4BI | 169.80 | Jade Green XBN Ptg. Paste | 126.00 |
| Brill. Orange M 2R | 313.15 | Red Brown H IF | 143.25 | Jade Green 2G Supra Disp. | 496.00 |
| Brill. Red H 8B | 169.45 | Orange Brown H 28 | 209.05 | Olive Green B Pdr. Fine | 399.90 |
| Brill. Scarlet H RN | 245.05 | Brown M GRN | 188.80 | Olive D Pdr. Fine | 444.30 |
| Supra Red H-3BP | 179.30 | Black H-N | 283.35 | Olive Green B Supra Disp. | 308.26 |
| Brill. Red H-F3B | 243.45 | | | Jade Green XBN Supra | |
| Brill. Magenta HB | 167.00 | SULFUR COLOURS | Per Kg. | Disp. (N) | 327.30 |
| Brill. Red M 5B | 98.90 | Navy Blue | 99.85 | Olive OMW Pdr. Fine | 698.55 |
| Brill. Red M 8B | 173.70 | Green G | 198.55 | Olive OMW Supra Disp. | 538.05 |
| Brill. Pink MB | 137.10 | Black Grains Extra | 63.05 | Olive R. Pdr. Fine | 422.96 |
| Brill. Magenta MB | 121.55 | Black Grains OG | 64.55 | Olive D Supra Disp. | 361.70 |
| Brill. Purple H-3R | 180.20 | Black GXE Conc. | 61.60 | Olive R Supra Disp. | 363.90 |
| Brill. Purple H-7R | 175.40 | Black GXE | 52.75 | Olive D. Ptg. Paste | 193.00 |
| Navy Blue H 3R | 298.50 | Black GXR | 61.60 | Olive Green B. Ptg. Paste | 199.10 |
| Brill. Blue H-GR | 366.55 | Black Grains 800 | 54.20 | Olive Green B Acra Conc. | 542.75 |
| Brill. Blue H 5G | 173.10 | Black EXR Grains | 64.55 | Olive R Acra Conc. | 640.00 |
| Blue H 5R | 283.85 | Black EXR Grains 800 | 51.25 | Olive Green B Acra Conc. | 542.75 |
| Brill. Blue H 7G | 178.70 | | | Brown R Pdr. Fine | 835.00 |
| Brill. Blue H 7RX | 358.15 | VAT COLOURS (ICI) | Per Kg. | Brown G. Pdr. Fine | 795.00 |
| Turquoise HA | 234.45 | Yellow 5G Powder Fine | 673.15 | Brown R Pdr. Fine | 659.75 |
| Supra Blue H-3RP | 335.70 | Yellow 5G Supra Disperse | 439.30 | Dark Brown 3R Pdr. Fine | 685.00 |
| Supra Turquoise H 2GP | 181.50 | Yellow 5G Acra Con. | 628.75 | Brown G. Supra Disp. | 449.90 |
| Blue H-ERD | 305.80 | Yellow 3R Powder | 588.85 | Brown 2G Supra Disp. | 554.00 |
| Navy Blue H ER | 258.60 | Gold Orange 3G Pdr. Fine | 952.15 | Brown R Supra Disp. | 422.95 |
| Blue H 5RX | 269.30 | Brill. Orange 6R Pdr. Fine | 624.35 | Brown BR Powder | 719.00 |
| | | Gold Orange 3G Supra Disp. | 601.30 | Dark Brown 3R Ptg. Paste | 217.15 |
| | | Brill. Orange 6RX Powder | 394.30 | Dark Brown 3R Supra Disp. | 414.55 |
| | | Brill. Red 3B Pdr. Fine | 997.80 | Brown G Acra Conc. | 733.95 |
| | | Brill. Red 3B Supra Disp. | 713.20 | Brown R Acra Conc. | 766.00 |
| | | Brill. Purple 4R Conc. Pdr. | 470.75 | Grey M. Powder Fine | 768.80 |
| | | Brill. Purple 3R Acra Powder | 690.85 | Grey M. Supra Disp. | 585.45 |
| | | Brill. Purple 2R Hly Conc. | 597.90 | Blue BC Acra Conc. Pdr. Fine | 762.70 |
| | | Brill. Purple 4R Supra Disp. | 500.05 | Direct Black AC Supra Disp. | 330.35 |
| | | Brill. Purple 2R Acra Conc. | 625.95 | Direct Black AC Pdr. Fine | 474.70 |
| | | Blue R Powder Fine | 542.15 | Direct Black CH Supra Disp. | 393.20 |
| | | Blue BC Conc. Pdr. Fine | 522.50 | Direct ACD Ptg. Paste | 217.15 |
| | | Blue BC Acra Conc. Pdr. Fine | 762.70 | | |

Madras Market

Moderate to sluggish trend prevailed during the week. Hydros prices ruled firm at Rs. 44 to Rs. 45. Benzene was in good demand with poor supplier. Sodium Cyanide prices went

up with reports of the manufacturers having raised their ex-plant prices. Diethylene Glycol continues to be in short supply with prices going up to Rs. 38 per kg.

(MADRAS MARKET RATES AS ON JUNE 25, 1983)

| | | | |
|---|------------|--|--------|
| Acetic Acid — Glacial (per kg) | 17.00 | Hydrosulphite of Soda TCPL (per kg) | 42.00 |
| Acid Slurry (Soft) (per kg) | 26.00 | Hydrosulphite of Soda IDI (per kg) | 45.50 |
| Aluminium Sulphate Iron free (per tonne) | 1,700.00 | Hydrosulphite of Soda BASF (per kg) | 45.00 |
| Ammonium Bi-carbonate (per 25 kg.) | 125.00 | Hydrogen Peroxide (India) (per kg.) | 35.00 |
| Ammonium Chloride SPIC (per tonne) | 1900.00 | Hyflo Supercell | 19.50 |
| Bleaching Powder — Mettur (per 25 kgs. bags) | 100.00 | Magnesium Carbonate Light | 18.00 |
| Borax Granular | 650.00 | Potassium Bichromate (per kg) | 24.00 |
| Cresylic Acid, 100% (per kg) | 26+E.D. | Phosphoric Acid (per kg) | 18.75 |
| Meta Cresol 40/42% (per kg) | 47.00+E.D. | Phthalic Anhydride (per kg) | 24.00 |
| Para Cresol 80/85% (per ton) | 60+E.D. | Pentaerythritol (per kg) | 52.00 |
| Caustic Soda Flakes (Mettur) (per ton) | 2,800.00 | Paraffin Wax (per kg) | 13.50 |
| Caustic Soda Flakes (Andhra Sugar) | 2,800.00 | Oxalic Acid (per kg.) | 20.00 |
| Citric Acid — Indian (per kg.) | 45.00 | Soda Ash (TAC) (Per 75 kg) | 306.00 |
| Copper Sulphate (per 50 kg) | 1000.00 | Soda Ash (TATA) (per 75 kg) | 310.00 |
| Formic Acid (India) (per kg) | 27.00 | Sodium Cyanide Indian (per kg) | 55.00 |
| Formaldehyde (per kg) | 8.00 | Sodium Cyanide Degussa (per kg) | 80.00 |
| Glycerine (per kg) | 42.00 | Sodium Bichromate (per kg) | 18.00 |
| | | Sodium Bicarbonate (per 50 kg) | 280.00 |

| | |
|---|-----------|
| Sodium Nitrite (per 50 kg) | 750.00 |
| Sodium Nitrate (per 50 kg) | 425.00 |
| Sodium Silicate (per tonne) | 4500.00 |
| Sodium Sulphate (per tonne) | 3500.00 |
| Sodium Sulphide Flakes (per tonne) | 13,000.00 |
| Sodium Bi-sulphite (per 50 kg) | 190.00 |
| Stearic Acid (per kg) | 32.00 |
| Trisodium phosphate (per 50 kg) | 380.00 |
| Titanium Di-oxide Indian TTP (per kg) | 48.00 |
| Titanium Di-oxide Indian Rutile (per kg) | 58.00 |
| Urea Tech (per tonne) | 2500.00 |
| Zinc Oxide (per kg.) | 34.00 |
| Zinc Chloride Powder (per kg.) | 13.00 |
| Zinc Sulphate (per tonne) | 4,500.00 |
| Di-octyl phthalate (per kg) | 44.00 |
| Di-butyl phthalate (per kg) | 44.00 |
| Hexamine (per kg) | 30.00 |

SOLVENTS

| | |
|--------------------------------------|-------|
| Acetone (I.O.C.) (per kg) | 18.00 |
| Isopropyl Alcohol NOCIL (per kg.) | 21.50 |
| Diacetone Alcohol NOCIL (per kg) | 28.50 |
| Benzene SAIL (per kg) | 16.00 |
| Diethylene Glycol NOCIL (per kg) | 35.00 |
| Butanol NOCIL (per kg) | 35.00 |
| Toluene SAIL (per litre) | 13.00 |
| Xylene IPCL (per litre) | 14.00 |
| Phenol HOC (per kg) | 28.00 |
| Turpentine (per litre) | 16.50 |
| Sorbitol (per kg) | 35.00 |
| Trichloroethylene MCIC (per kg) | 23.50 |
| Carbon Tetra Chloride (per kg) | 15.50 |
| Chloroform (per kg) | 25.00 |
| Methylene chloride (per kg) | 24.00 |
| Methyl Ethyl Ketone (per kg.) | 42.00 |
| Cellosolve (per kg) | 50.00 |
| Triethanolamine (per kg) | 23.50 |
| Ethyl Acetate (per kg.) | 22.00 |
| Butyl Acetate (per kg) | 38.00 |
| Methanol (per litre) | 10.00 |

Delhi Market

DELHI : JUNE 24, (NNS) — A smart rise of Rs. 7 per kg, was noticed in hexamine during the last week in the local chemicals market. Sodium hydro sulphate was also up by Rs. 1/1.50. On the other hand soda ash Tata and soda bicarb lost Rs. 7/10 in the wake of sufficient arrivals from Gujarat. Turnover in the local market remained poor due to marriage days.

Hexamine prices increased smartly from Rs. 35 to Rs. 42 per kg. on acute shortage of the chemicals. Following fall in supply sodium hydro sulphite Damosha and Kalali were traded higher by Rs. 1 and Rs. 1.50 at Rs. 40 and Rs. 42 per kg. Sodium hydro sulphite remained firm at Rs. 43 on tight stock. Sodium hydro sulphite prices were expected to increase further due to rise in zinc metal prices. Demand from gur manufacturers would also revive in the month of September also. Following keen buying interest shown by stockists and fall in arrivals of new crop produce from Sambhal and Moradabad. Menthol flake medium and bold registered a rise of Rs. 18/20 at Rs. 203, Rs.220 and Rs. 230 per kg respectively. Men-

tha oil was also traded higher at Rs. 170 against Rs. 150. DMO moved up from Rs. 80 to Rs. 85. Menthol flake June Delivery was traded at Rs. 215, while July Delivery was offered at Rs. 230.

Copper sulphate flared up by Rs. 100 at Rs. 1900/2200 a quintal on account of sharp rise in copper metal. Following the absence of fresh import from France and tight stock position, tartaric acid gained Rs. 25 at Rs. 6400. Ammonia bicarb increased by Rs. 5 at Rs. 123 thanks to keen demand shown by bakeries. On receipt of 6/7 wagon load from Gujarat and fall in offtake due to rains, soda ash Tata decreased by Rs. 7 at Rs. 300 per bag. Soda ash Birla was easy by Rs. 2 at Rs. 300. Soda bicarb Tata suffered a fall of Rs. 8/10 at Rs. 260/270. Caustic soda flake remained unchanged at Rs. 403/404. On arrivals of 17 tonnes from Germany and poor buying interest boric acid lost Re. 1 at Rs. 25. Paraffin wax again lost Rs. 15 at Rs. 610 in the absence of sufficient offtake.

Dyes and colours remained unchanged.

(DELHI MARKET RATES AS ON JUNE 24, 1988)

| | |
|---|--------------|
| Ammonia Bicarb (per 25 kg) | 123.00 |
| Mercury (per flask) | 10,250.00 |
| Soda ash (per bag) | 270-300.00 |
| Ammonium chloride (per 50 kg) | 125-180.00 |
| Caustic soda solid | No Stock |
| Caustic soda flakes (per 50 kg) | 403-404.00 |
| Citric acid (per 50 kg) | 2050-2400.00 |
| Stable Bleaching Powder Shriram (per 25 kg) | 95.00 |
| Stable Bleaching Powder KCI (per 25 kg) | 85.00 |
| Stable Bleaching Powder MODI (per 25 kg.) | 90.00 |
| Sod. Bicarbonate (per 50 kg) | 260-270.00 |
| Sod. Hydro Sulphite (per kg) | 40-43.00 |
| Rangolite (per kg) | 48.00 |

| | |
|----------------------------------|--------------|
| Boric acid Technical (per 50 kg) | 1050.00 |
| Paraffin wax (per 50 kg) | 610.00 |
| Tartaric acid (per 50 kg) | 6,375.00 |
| Borax Granular (per 50 kg) | 575.00 |
| Borax Crystal (per 50 kg) | 600.00 |
| Sodium Nitrate (per 50 kg) | 450.00 |
| Sodium Nitrite (per 50 kg) | 750-775.00 |
| Camphor Powder (per kg) | 87.00 |
| Camphor Thal (per kg) | 97.00 |
| Menthol Medium (per kg) | 220.00 |
| Menthol Flakes (per kg) | 208.00 |
| Menthol Bold (per kg) | 230.00 |
| Glycerine (per kg) | 42-43.00 |
| Sodium Silicate (per quintal) | 200-250.00 |
| Hexamine (per kg) | 42.00 |
| Acetic Acid Glacial (per kg) | 13-13.50 |
| Copper Sulphate (per quintal) | 1900-2200.00 |

| | |
|-----------------------------------|------------------|
| Formic acid (per kg) | 25.00 |
| Formaldehyde (per kg) | 8.00 |
| Hydrogen Peroxide (per kg) | 30-32.00 |
| Calcium Carbonate (per tonne) | 2500-4000.00 |
| Acid Slurry Soft (per kg) | 24.00 |
| Acid Slurry Hard (per kg) | 32.00 |
| Phosphoric Acid (per 50 kg) | 825.00 |
| Pot. Nitrate (per quintal) | 900-1200.00 |
| Pot. Permanganate (per 50 kg) | 2300.00 |
| Sod. Bichromate (per 50 kg) | 1050-1150.00 |
| Tri-Sod. Phosphate (per 50 kg) | 325-360.00 |
| Titanium Dioxide Anatase (per kg) | 47.50 |
| Titanium RC-822 (per kg) | 64.00 |
| Zinc Oxide (per mt) | 32,000-40,000.00 |
| Phenol Carbolic Acid (per kg) | 33.00 |
| Carbon Tetrachloride (per kg) | 19.00 |
| Chloroform (per kg) | 28.00 |
| Sodium Sulphate (per 50 kg) | 160-170.00 |
| Naphthalene Balls (per 50 kg) | 1400.00 |

DYES & COLOURS per kg

| | |
|---------------|--------|
| Naphthol AS | 150.00 |
| Naphthol ASG | 235.00 |
| Naphthol ASBS | 200.00 |
| Naphthol ASTR | 302.00 |

| | |
|---------------|--------|
| Naphthol ASOL | 191.00 |
| Naphthol ASBO | 208.00 |

DIRECT DYES (per kg)

| | |
|--------------------------|------------|
| Black E. Conc. | 92-155.00 |
| Diazo Black B.T. | 125.00 |
| Green B. | 119.00 |
| Blue 2-B | 86.00 |
| Skv Blue FB | 200.15 |
| Basic Auramine 'O' Conc. | 55-100.00 |
| Basic Rhodamine B.500% | 220-320.00 |
| Basic Methylene Blue | 92-130.00 |
| Basic Violet | 142-160.00 |
| Basic Malachite Green | 160-185.00 |
| Acid Orange | 45-52.00 |

Materials Imported

BOMBAY

(From 3.2.1988 to 5.2.1988)

ACEPHATE TECH. GRADE
97% : From USA: Rallis India Ltd., 10,000 kgs., Rs. 17,20,280.

ACETIC ANHYDRIDE: From FRG : Triochem Products Ltd., 30,400 kgs., Rs. 2,99,965; Uni-chem Laboratories Ltd., 9,400 kgs., Rs. 1,12,279; From Japan : Vipul Dyes & Chemicals P. Ltd., 32 Mts., Rs. 4,15,464.

ACETO ACID BENILAMIDE
100% : From FRG : BASF India Ltd., 345.1 kgs., Rs. 53,144.

ACETONITRILE : From Taiwan : Indian Drugs & Pharmaceuticals Ltd., 60,000 kgs., Rs. 6,79,444; Lyka Labs. Ltd., 12,000 kgs., Rs. 1,63,588.

ACRYLAMIDE : From Japan: LN Chemical Indus., 2,040 kgs., Rs. 43,702; PDI Chemicals Pvt. Ltd., 2,040 kgs., Rs. 43,701; Sap Chemical Inds. Pvt. Ltd., 1,020 kgs., Rs. 21,851; Shalimar Chemicals Ind. Ltd., 15,000 kgs., Rs. 2,92,125.

ACRYLIC RESIN : From UK: Coates of India Ltd., 570 kgs., Rs. 24,227.

ADIPIC ACID RESIN GRADE: From USA : Indian Dyestuff Inds. Ltd., 3,129.84 kgs., Rs. 48,703.

AEROSIL 200 : From FRG : Revex Plasticizer Pvt. Ltd., 480 kgs., Rs. 48,888.

AEROSIL FUMED SILICA : From FRG : Goodlass Nerolac Paints Ltd., 300 kgs., Rs. 38,255.

ALBENDAZOLE : From China : Wockhardt Veterinary Pvt. Ltd., 150 kgs., Rs. 1,23,179.

ALDEHYDE C-9, C-10, C-11, C-12 : From Japan : Bharat Industrial Complex, 1,000 kgs., Rs. 1,74,949.

ALDRIN TECHNICAL: From Netherlands : Pest Control (In-

dia) Pvt. Ltd., 1,950 kgs., Rs. 2,06,159.

ALPHA HEXYL CINNAMIC ALDEHYDE : From Switzerland: Vasu Agarbathies, 50 kgs., Rs. 7,549.

D-ALPHA PHENYLGLYCINE BASE : From Taiwan : Armour Chemicals Pvt. Ltd., 20,000 kgs., Rs. 30,38,080.

D(-) ALPHAPHENYL GLYCINE CHLORIDE HYDROCHLORIDE : From Netherlands : Gujarat Lyka Organics Ltd., 2,870 kgs., Rs. 9,34,425.

ALPHA PINENE : From Finland : Camphor & Allied products Ltd., 1,26,000 kgs., Rs. 16,11,837.

ALUMINIUM OXIDE SYNTHETIC : From China : Grindwell Norton Ltd., 1,00,000 kgs., Rs. 6,62,146; Sterling Abrasives Pvt. Ltd., 20 kgs., Rs. 1,37,622.

ALUMINIUM STEARATE : From FRG : Usha Intercontinental, 3 Mts., Rs. 67,221.

AMINO BENZOIC ACID : From FRG : The Atul Products Ltd., 5,672 kgs., Rs. 9,61,627.

DL-2 AMINOBUTANOL 1 : From FRG : Cadila Laboratories Pvt. Ltd., 7,000 kgs., Rs. 8,17,113.

ANILINE OIL : From Romania : Priya Chemicals, 40 Mts., Rs. 24,80,430.

ANISIC ALDEHYDE : From Switzerland : Vasu Agarbathies; 25 kgs., Rs. 8,052.

BARIUM CARBONATE OF PURITY 98.99% : From FRG : Peico Electronics & Electrical, 2,900 kgs., Rs. 29,489; From Netherlands : Peico Electronics & Electrical, 200 kgs., Rs. 42,796.

BEHENYL ALCOHOL : From FRG : BASF India Ltd., 675 kgs., Rs. 21,670.

BENTONITE CLAY : From USA : Abbott Labs (India) Ltd., 90.72 kgs., Rs. 10,601.

BETAINE HYDROCHLORIDE USP : From FRG : Vilco Laboratories Pvt. Ltd., 50 kgs., Rs. 5,908.

BETA NAPHTHOL : From Italy : Mangalya Trading & Investments, 7500 kgs., Rs. 2,43,436; Sudarshan Chemical Inds. Ltd., 2,650 kgs., Rs. 92,896.

1 BROMO 3 CHLORO PROPANE : From FRG : Tata Exports Ltd., 2,500 kgs., Rs. 1,83,329.

BUTACHLOR TECHNICAL : From USA : Omega Agro Pvt. Ltd., 15,840 kgs., Rs. 6,16,590; Sanvin Laboratories, 31,679 kgs., Rs. 12,33,180.

1-4 BUTANE DIOL : From FRG : Kemsyn Hypers, 1,000 kgs., Rs. 32,592.

N BUTANOL : From FRG : Citroflex Pvt. Ltd., 66,300 kgs., Rs. 7,26,028.

N-BUTENE-1 : From FRG : Indian Petrochemicals Corpn. Ltd., 37.350 Mts., Rs. 7,61,955.

N BUTYLAMINE : From FRG : Nirlan Syn Fibres & Chem Ltd., 600 kgs., Rs. 17,111.

BUTYL METHACRYLATE : From France : Goodlass Nerolac Paints Ltd., 7,955 kgs., Rs. 1,88,489.

BUTYL TITANATE : From Japan : Dr. Beck & Co. (India) Ltd., 16,000 kgs., Rs. 5,71,263.

N BUTYL VINYL ETHER : From USA : Searle (India) Ltd., 318 kgs., Rs. 25,447.

CALCINED PETROLEUM COKE : From Japan : Carbon Corpn. Ltd., 200 Mts., Rs. 12,61,972.

CALCIUM FLUORIDE: From Japan : Sylvania & Laxman Ltd., 400 kgs., Rs. 30,078.

CAPROLACTAM : From Belgium : Garware Nylons Ltd., 1,77,500 kgs., Rs. 43,55,555; Shree Synthetics Ltd., 111 Mts.,

Rs. 27,23,755; From Netherlands: Century Enka Ltd., 2,55,000 kgs., Rs. 62,57,276.

CAPROLACTUM MONOMER: From Netherlands: Modi Rubber Ltd., 2,55,000 kgs., Rs. 62,57,276.

CARBON BLACK: From FRG: Asian Paints India Ltd., 1,200 kgs., Rs. 1,95,063; Garware Paints Ltd., 600 kgs., Rs. 1,00,954; UK Paint Industries, 1.2 Mts., Rs. 1,87,241; From UK: The Standard Batteries Ltd., 800 kgs., Rs. 12,754.

L CELLULOSE ACETATE LACQUER: From FRG: Kiran X-Ray Screens Ltd., 450 Ltr., Rs. 30,652.

CERAMIC COLOURS: From Italy: The Parshuram Pottery Works Co., 1400 kgs., Rs. 1,06,748.

3-CHLORO-4-FLUORO ANILINE: From UK: Benzex Labs Ltd., 500 kgs., Rs. 1,90,160.

2-CHLORO-N (HYDROXYL METHYL) ACETAMIDE ISOTHIAZOLONE DERIVATIVE: From FRG: Mafatlal Dyes & Chemicals, 120 kgs., Rs. 10,328.

CHLOROPROPIONIC ACID: From UK: Indmag Pvt. Ltd., 5,000 kgs., Rs. 1,06,281.

N - CHLORO SUCCINIMIDE (NCS): From Australia: Ranbaxy Laboratories Ltd., 1.175 kgs., Rs. 2,05,651.

CHLOR PHENIRAMINE BASE: From Japan: Transchem Pvt. Ltd., 1,000 kgs., Rs. 5,46,868.

CLOVE LEAF OIL: From Indonesia: Shukla & Co. 5,000 kgs., Rs. 1,49,307.

COPPER PHTHALOCYANINE: From Taiwan: Jindal Dye Intermediate Pvt. Ltd., 9,500 kgs., Rs. 4,19,359.

CREOSOTE BPC: From Sweden: Warner Hindustan Ltd., 120 kgs., Rs. 41,925.

N-CYANOETHYL-N-HYDROXYETHYL: From USA:

Nirup Synchro Pvt. Ltd., 979 kgs., Rs. 1,81,143.

2 CYANO 4 NITRO, ANILINE: From Japan: Nirup Synchro Pvt. Ltd., 600 kgs., Rs. 1,73,526.

2 CYANOPYRAZINE: From Japan: Armour Chemicals Pvt. Ltd., 1,000 kgs., Rs. 5,52,127.

CYANURIC CHLORIDE: From Japan: Hickson & Dadajee Ltd., 10,000 kgs., Rs. 4,48,140.

CYCLOHEXANONE: From China: Hindustan Ciba Geigy Ltd., 13,680 kgs., Rs. 1,77,610; From FRG: India Pesticide Pvt. Ltd., 37,600 kgs., Rs. 6,12,729.

DEHYDRO THIO PARA TOLUIDINE SULPHONIC ACID: From FRG: Golden Dyes Corpn. (I) P. Ltd., 500 kgs., Rs. 1,27,109.

DEOILED LECITHIN POWDER: From USA: Jai Electronic Inds. P. Ltd., 55 kgs., Rs. 7,312.

4, 4-DIAMINOBENZENEANILIDE: From Japan: The Atul Products Ltd., 3,000 kgs., Rs. 8,86,558.

DICARBOXYLIC ACID: From Netherlands: BASF India Ltd., 30,000 kgs., Rs. 3,54,443.

DICHLOROACETYLCHLORIDE: From Japan: Nitson Laboratories, 5,000 kgs., Rs. 1,84,024.

DICHLORONAPHTHAQUINONE: From Japan: Ideal Dye Chem Inds., 1,000 kgs., Rs. 1,46,182.

DICYANDIAMIDE: From FRG: Explogel India, 64 Mts., Rs. 15,38,342; Sultanchand Bimalprakash, 16,000 kgs., Rs. 3,84,586.

N N DIETHYLAMINE 3 PROPIONYLAMINE BENZOL: From Switzerland: Sandoz (I) Ltd., 2,300 kgs., Rs. 7,15,780.

DIETHYLENE DIAMINE: From Sweden: Mehta Pharmaceutical Inds., 12.35 Mts., Rs. 3,23,091.

DIETHYL SULPHATE: From Japan: Jindal Dye Intermediate P. Ltd., 15,640 kgs., Rs. 2,87,842.

DIHYDRO MYRCENOL: From Spain: The Tata Oil Mills Co. Ltd., 600 kgs., Rs. 60,372.

2,4 DIHYDROXY QUINOLINE: From FRG: Rathi Dye Chem P. Ltd., 118.7 kgs., Rs. 42,846.

DIMETHYL ACETAMIDE: From FRG: Tini Pharma Pvt. Ltd., 5130 kgs., Rs. 1,36,538.

3,3 DIMETHYL 4,4 DIAMINE DICYCLOHEXYL METHANE: From FRG: Hindustan Ciba Geigy Ltd., 180 kgs., Rs. 25,666.

N DIMETHYL ANILINE: From UK: K. Patel Chemo Pharma Pvt. Ltd., 14,400 kgs., Rs. 3,56,526; Ravi Chem Dye, 14,400 kgs., Rs. 3,56,526.

DIMETHYL DICHLOROSILANE: From France: Hico Products Ltd., 14,400 kgs., Rs. 4,45,858. From FRG: Cepham Laboratories Ltd., 3150 kgs., Rs. 1,15,498.

DIMETHYL FORMAMIDE: From FRG: Nimex Trading Corpn., 7,410 kgs., Rs. 91,395; From Japan: Indian Dyestuff Ind. Ltd., 7.6 Mts., Rs. 85,352; Indian Petrochemicals Corpn., Ltd., 152 Mts., Rs. 14,14,548.

DIMETHYL TEREPHTHALATE: From FRG: Garware Nylon Ltd., 1,99,800 kgs., Rs. 16,82,096; From Spain: I.E.L. Limited, 360 Mts., Rs. 26,64,162; India Polyfibres Ltd., 500 Mts., Rs. 37,65,142.

DIMETHYL UREA: From FRG: Tata Exports Ltd., 13,500 kgs., Rs. 2,35,018.

DIOCTYL TIN OXIDE: From Japan: ALA Chemicals Ltd., 1,000 kgs., Rs. 1,34,613.

DIPHENYLAMINE: From Japan: Amritalal Chemaux Ltd., 2580 kgs., Rs. 83,741; From UK: Golden Dyes Corpn.,

P. Ltd., 9,800 kgs., Rs. 2,43,656.

DIPHENYL OXIDE: From China: Nirma Detergents: 32,000 kgs., Rs. 6,43,969.

DIPHENYLOXIDE TECH: From USA: Nirala Chemical Inds., 1077.3 kgs., Rs. 23,498; Oswal Soap & Allied Inds., 3016.44 kgs., Rs. 65,794; Spana Detergents Inds., 1077.3 kgs., Rs. 23,498; The Tata Oil Mills Co. Ltd., 15,513.12 kgs., Rs. 3,38,370.

DMT: From Spain: J.K. Synthetics Ltd., 10,00,000 kgs., Rs. 74,00,451.

EMERY: From USA: Nirup Synchrome Ltd., 423.21 kgs., Rs. 1,19,541.

ENZYMES: From Denmark: Unique Sugars Ltd., 2,211 kgs., Rs. 2,08,235.

EPICHLOROHYDRIN: From Japan: Excel Inds. Ltd., 15,840 Mts., Rs. 3,49,613; From Japan: Indmag Pvt. Ltd., 15,840 kgs., Rs. 3,49,614.

EPOXY HARDENER B-55: From FRG: Marpol Chemicals Pvt. Ltd., 40 kgs., Rs. 8,865.

EPOXY HARDENER B-68: From FRG: Marpol Chemicals Pvt. Ltd., 60 kgs., Rs. 17,160.

ETHOXY ACETYLAMINE NN BIS ETHOXY ETHYLANILINE: From Japan: The Atul Products Ltd., 1,800 kgs., Rs. 4,46,364.

ETHOXY METHYLENE MALONIC ACID ESTER: From FRG: IPCA Laboratories Pvt. Ltd., 6,000 kgs., Rs. 9,11,424.

N ETHYLANILINE: From FRG: Chemiequip Ltd., 1 Mt., Rs. 46,851.

ETHYLENE CHLOROHYDRINE: From FRG: German Remedies Ltd., 2,530 kgs., Rs. 71,120.

ETHYL GLYCOL D: From FRG: Garware Paints Ltd., 15,288 kgs., Rs. 2,16,497.

2 ETHYL HEXANOIC ACID: From France: Brij Chem P. Ltd., 6,845 kgs., Rs. 96,869.

2 ETHYL HEXYL ACETATE: From UK: BASF India Ltd., 14,118 kgs., Rs. 3,23,468.

ETHYL HEXYL ACRYLATE: From FRG: Sanghi Leather Pvt. Ltd., 14,040 kgs., Rs. 2,76,897.

2 ETHYL THIOETHANOL: From FRG: Cadila Laboratories Pvt. Ltd., 2,000 kgs., Rs. 49,336.

FERRIC AMMONIUM EDTA: From UK: Agfa Gevaert India Ltd., 3,000 kgs., Rs. 90,581.

FERRIC OXIDE RED: From FRG: Parke Davis (I) Ltd., 300 kgs., Rs. 24,443.

FORMIC ACID: From FRG: G. Amphray Laboratories, 17,150 kgs., Rs. 1,31,370.

GAMMA FERRIC OXIDE: From FRG: Jai Electronic Inds. Ltd., 10,000 kgs., Rs. 4,72,584.

GLUTARALDEHYDE: From FRG: J N Chemicals, 480 kgs., Rs. 28,379.

GLYCEROL TRIACETATE: From UK: Hitari Multifilters P. Ltd., 960 kgs., Rs. 24,117.

GLYOXAL: From FRG: Unique Pharm Labs., 102.9 Mts., Rs. 10,58,095.

GLYOXAL 40%: From FRG: Metroni Drugs Pvt. Ltd., 35,000 kgs., Rs. 2,79,964.

GUM ARABIC: From Nigeria: Rubman Polymers P. Ltd., 10,000 kgs., Rs. 1,19,464.

GUM ROSIN: From China: Dujodwala Resins & Terpenes P. Ltd., 149.85 Mts., Rs. 9,58,178; Sarvodaya Resin Works, 49.95 Mts., Rs. 3,24,257; From Hong Kong: The Rahuri S S K Ltd., 18 Mts., Rs. 1,16,849; Warna S.S.K. Ltd., 18 Mts., Rs. 1,16,849; From Indonesia: Flour And Food Ltd., 18 Mts., Rs. 1,20,355; Power Drink, 18 Mts., Rs. 1,21,523; From UAE: Ruby Pa-

per Mills Pvt. Ltd., 18 Mts., Rs. 1,31,000.

HEDIONE: From Switzerland: Hindustan Lever Ltd., 1,600 kgs., Rs. 6,92,468.

HEPTENE: From USA: Indu Nissan Oxo Chemical Inds., 1991.979 Mts., Rs. 1,65,51,908.

HEXA BROMIDE: From FRG: BASF India Ltd., 600 kgs., Rs. 64,422.

HYDRATED SILICON DIOXIDE: From UK: Hindustan Lever Ltd., 44,825 kgs., Rs. 11,74,776.

HYDROGEN PEROXIDE: From Belgium: M K Fisheries, 17.28 Mts., Rs. 1,48,71; From Italy: Kitachand Devchand & Co. P. Ltd., 41,300 kgs., Rs. 3,56,578.

HYDROXY ETHYL CELLULOSE: From Netherlands: Pyrene Rai Metal Treatments Ltd., 500 kgs., Rs. 32,458.

HYDROXY METHYL CELLULOSE: From Japan: Peico Electronics & Electrical, 40 kgs., Rs. 6,519.

3-HYDROXY QUINALDINE 4-CARBOXYLIC ACID: From FRG: Amar Dye Chem Ltd., 467.5 kgs., Rs. 1,62,271.

IODINE CRUDE: From Japan: Lub Cut Incorporation, 1000 kgs., Rs. 2,29,154; Mehta Wire & Metal Inds. P. Ltd., 960 Mts., Rs. 2,30,582; Santosh Pharmaceuticals, 1 Mt., Rs. 2,29,154.

ISOBUTANOL: From FRG: Peico Electronics & Electrical Ltd., 75 kgs., Rs. 3,291.

ISOBUTYRIC ACID: From FRG: Krupa Scientific & Industrial, 1,000 kgs., Rs. 23,629.

ISOPHORONE DIAMINE: From FRG: Hindustan Ciba Geigy Ltd., 180 kgs., Rs. 16,866.

ISOPHTHALIC ACID: From Japan: Rallis India Ltd., 2,000 kgs., Rs. 25,447.

ISOPHYTOL: From FRG:

E. Merck (India) Ltd., 4,080 kgs., Rs. 8,22,785.

LACTOSE: From FRG: E. Merck (India) Ltd., 8000 kgs. Rs. 94,347, Sevantilal Kantilal Pvt. Ltd., Rs. 9,000 kgs., Rs. 1,05,816; Wyeth Laboratories Ltd., 9,000 kgs., Rs. 1,12,327; From Netherlands: Sandoz (India) Ltd., 18,000 kgs. Rs. 2,37,695.

LACTOSE BP/IP: From FRG: F D C Pvt. Ltd., 5,000 kgs., Rs. 59,690.

LACTOSE BP/USP: From Netherlands, Gufic Pharma Pvt. Ltd., 5,000 kgs., Rs. 62,405.

LACTOSE BP/USP/IP: From Netherlands: K. Sevantilal & Co., 18,000 kgs., Rs. 1,86,841.

LEMON OIL IP/BP: From UK: America Dry Fruit Stores, 2,000 kgs., Rs. 86,957.

LILIAL: From Switzerland: Vasu Agarbathies: 100 kgs., Rs. 30,195.

LITHIUM CARBONATE: From China: National Marketing Corpn., 3,000 kgs., Rs. 1,15,900.

LITHIUM HYDROXIDE MONOHYDRATE: From USA: May & Baker (India) Ltd., 1,100 Ltr., Rs. 28,920.

2, 6 LUTIDINE: From Japan: Tini Pharma Pvt. Ltd., 555 kgs., Rs. 1,18,318.

L-LYSINE MONO HCL USP: From Japan: Sarabhai International Ltd., 1,000 kgs., Rs. 59,723.

MAGNESIUM OXIDE: From Japan: Roche Products Ltd., 1,500 kgs., Rs. 58,619.

MALIC ACID: From Canada: Pioma Industries, 19 Mts., Rs. 3,20,686.

META NITROCHLORO BENZENE: From France: Hiremath Chemicals Ltd., 20 Mts., Rs. 77,900.

METHACRYLIC ACID: From Japan: Ion Exchange (India) Ltd., 4,242 kgs., Rs. 1,55,170.

METHOXY PROPYLAMINE: From FRG: Jaysynth Dychem Pvt. Ltd., 2,890 kgs., Rs. 1,69,543.

METHYL ACETO ACETATE: From Japan: Goodlass Nerolac Paints Ltd., 7,955 kgs., Rs. 1,88,489.

METHYL CHLOROFORMATE: From Hungary: Cipla Ltd., 3,000 kgs., Rs. 58,425; Jal Pvt. Ltd., 5 Mts., Rs. 94,127; From USA: Gujarat Insecticides Ltd., 30,372 kgs., Rs. 5,18,540.

METHYL DICHLORO ACETATE: From Japan: Nirlac Chemicals 2,000 kgs., Rs. 76,772.

METHYL ISO BUTYL KETONE: From Taiwan: Zenith Ltd., 26,400 kgs., Rs. 2,94,770.

MONTANA WAX: From Germany: Sarbi Petroleum & Chemicals Pvt. Ltd., 6,000 kgs., Rs. 54,405.

MYRISTYL ALCOHOL: From U.S.A.: Ballarpur Inds. Ltd., 25.855 Mts., Rs. 73,404.

MYRISTYL BROMIDE: From Netherlands: Unilab Chemicals & Pharmaceuticals, 1,330 kgs., Rs. 82,022.

NALIDIXIC ACID: From U.K.: Win Medicare Ltd., 1,000 kgs., Rs. 8,75,532.

NAPHTHA SOLVENT SOLUTION: From U.S.A.: Johnson & Johnson Ltd., 349.2 kgs., Rs. 30,240.

NATURAL ESSENTIAL OIL: From China: Gupta & Co. Pvt. Ltd., 210 kgs., Rs. 19,280.

NITRO CELLULOSE LACQUER: From Japan: Kiran X-Ray Screens Ltd., 450 kgs., Rs. 39,961.

P-NITRO-M-CRESOL MOIST: From F.R.G.: Bayer (India) Ltd., 6,840 kgs., Rs. 2,92,032.

NOVALDIAMINE: From F.R.G.: IPCA Laboratories Pvt. Ltd., 1,980 kgs., Rs. 6,25,317.

OCTADECYL ETHYLENE UREA: From Japan: C.D. Cor-

poration 250 kgs., Rs. 26,292.

OCTYL PHENOL: From F.R.G.: PDI Chemicals Pvt. Ltd., 2,500 kgs., Rs. 56,802; From Japan: Sandoz (India) Ltd., 4 Mts., Rs. 77,900.

D-PANTOTHENYL ALCOHOL: From Japan: Rallis India Ltd., 500 kgs., Rs. 97,374.

PARACHLOROTOLUENE: From U.S.A.: Gitanjali Chemicals Ltd., 11,250 Lbs., Rs. 1,32,916.

PARA CRESIDINE: From Japan: Formkem (India) Corpn., 500 kgs., Rs. 81,505.

PARA CRESOL: From U.K.: Phin O Chem Inds., 16,000 kgs., Rs. 6,06,770.

PARAFORMALDEHYDE: From Taiwan: Ion Exchange (India) Ltd., 17.5 Mts., Rs. 95,080.

D(-) PARA HYDROXY PHENYL GLYCINE METHYL POTASSIUM DANE SALT: From Japan: Ranbaxy Laboratories Ltd., 2,500 kgs., Rs. 5,61,525.

PARA - NITROCHLORO BENZENE: From U.S.A.: Srinivasa Agro Inds., 38.6 Mts., Rs. 5,71,315.

PARA OCTYL PHENOL: From Japan: Silvoliacal Chemical Pvt. Ltd., 5 Mts., Rs. 90,883.

PARA TERTIARY BUTYL CYCLO HEXANOL: From F.R.G.: Hindustan Lever Ltd., 3,000 kgs., Rs. 1,55,219.

PARA TERTIARY BUTYL PHENOL: From Japan: Keshavlal Talakchand, 5,000 kgs., Rs. 84,391.

PARAXYLENE: From Turkey: Bombay Dyeing & Mfg. Co. Ltd., 3,800.87 Mts., Rs. 1,80,40,641.

PEROXY ACETIC ACID 38-40% SOLN.: From U.K.: Max India Ltd., 6,000 kgs., Rs. 2,87,685.

PHENOL: From Japan: Anchemo Ltd., 10,000 kgs., Rs. 1,31,131; BASF India Ltd., 31,200 kgs., Rs. 3,88,874; Excel Inds. Ltd., 15,600 kgs., Rs. 1,99,744.

PHENOL USP: From Japan: Diamond Chemicals, 4,000 kgs., Rs. 54,530; Super Urecoat Inds. Pvt. Ltd., 6,000 kgs., Rs. 81,795.

PHENYL PROPANOLAMINE HYDROCHLORIDE: From Japan: May & Baker (India) Ltd., 150 kgs., Rs. 66,412.

PHENYL PROPYL ALCOHOL: From Switzerland: Vasu Agarbathies, 200 kgs., Rs. 32,208.

PHTHALIC ACID PURE: From U.K.: Reliance Industries Ltd., 1,000 Mts., Rs. 73,51,585.

PHTHALIC ANHYDRIDE: From Italy: Jindal Dye Intermediate Pvt. Ltd., 37,500 kgs., Rs. 1,55,636.

PIPERAZINE ANHYDROUS: From Belgium: Ranbaxy Laboratories Ltd., 3,000 kgs., Rs. 1,61,155.

PIPERIDINE: From U.S.A.: Gharda Chemicals Pvt. Ltd., 170 kgs., Rs. 14,347.

POLYISOBUTYLENE: From U.S.A.: Morris Electronics Ltd., 2.75 Mts., Rs. 85,679.

POLYOL: From U.S.A.: Sheela Foam (P) Ltd., 51,600 kgs., Rs. 6,16,340.

POLYOL/POLYETHER: From Belgium: Dura Foam Inds. Pvt. Ltd., 15.48 Mts., Rs. 1,86,912.

POLYVINYL ALCOHOL: From Japan: Arav Enterprise: 17,000 kgs., Rs. 3,53,144; Asian Textiles, 2,500 kgs., Rs. 56,802; Decent Silk, 2,500 kgs., Rs. 56,802; Jairam Textile, 2.5 Mts., Rs. 53,556; Sehgal Knitwear, 14.9 Mts., Rs. 3,28,865; The Simples Mills Co. Ltd., 1,000 kgs., Rs. 20,773.

POLYVINYL PYROLIDONE USP/IP: From F.R.G.: Sarabhai Chemicals, 1,750 kgs., Rs. 3,19,189.

N. PROPYLAMINE: From F.R.G.: Pfizer Ltd., 4,620 kgs., Rs. 1,69,397.

PROPYLENE GLYCOL: From U.S.A.: Satyen Chemicals Indus., 17,200 kgs., Rs. 1,80,882.

PROPYLENE GLYCOL USP: From U.S.A.: Mahindra & Mahindra Ltd., 41,925 kgs., Rs. 4,46,345; Sarabhai Chemicals, 68,800 kgs., Rs. 7,54,080; Themis Pharmaceuticals, 17,200 kgs., Rs. 1,84,232.

PYRIDINE PURE: From Japan: Selkasaria Chemicals P. Ltd., 1,170 kgs., Rs. 79,881.

PYRIDOXIN HYDROCHLORIDE: From Japan: Rallis India Ltd., 400 kgs., Rs. 1,86,959.

SILICONE OIL: From Belgium: Peico Electronics & Electricals, 20 kgs., Rs. 27,638.

SILICON METAL: From Italy: Emmes Metals Pvt. Ltd., 40,000 kgs., Rs. 6,95,902.

SILICON POWDER: From FRG: 500 kgs., Rs. 4,327.

SIZING CHEMICALS: From Japan: Reliance Inds. Ltd., 14,800 kgs., Rs. 2,55,562.

SLUDGE OIL: From UAE: International Marine Works., 15 Mts., Rs. 15,000.

SODIUM FERROCYANIDE: From FRG: Pfizer Ltd., 4,000 kgs., Rs. 86,369; From U.K.: Sudarshan Chemicals Inds., 20,000 kgs., Rs. 2,80,197.

SODIUM METHALLYL SULPHONATE: From Japan: Indian Petrochemicals Corp Ltd; 17,500 kgs., Rs. 8,68,025.

SODIUM METHOMIDE: From FRG: Glindia Ltd., 2,500 kgs., Rs. 1,29,350; From FRG:

Reine Chemicals, 1,000 kgs., Rs. 51,740.

SODIUM NITRATE: From UK: Golden Dyes Corp., P. Ltd., 4,700 kgs., Rs. 30,511.

SOLVENT NAPHTHA: From Belgium: Asian Paints India Ltd., 10,065 kgs., Rs. 92,780.

SOYA LECITHIN: From Brazil: NM Chemicals, 15,000 kgs., Rs. 97,374; NM Chemicals 7.6 Mts., Rs. 49,336, Universal Polymers, 25 Mts. Rs. 1,65,536.

STEARYL METHACRYLATE: From France: Indofil Chemicals Ltd., 13,500 kgs., Rs. 4,09,012.

STRONTIUM CARBONATE: From Netherlands: Peico Electronics & Electrical, 50 kgs., Rs. 1,031.

SUCCINIC ANHYDRIDE: From Australia: SD Fine Chem Pvt. Ltd., 18 Mts., Rs. 6,49,924.

SULPHUR: From UAE: Rashtriya Chemicals & Fertilizers, 4,000 Mts., Rs. 62,18,982.

SYNTHETIC RESIN: From USA: Bahubali Plastics Ltd., 15,000 kgs., Rs. 2,37,593; Polytechno Industries, 15 Mts., Rs. 2,47,330; Print Pack Packaging, 30 Mts. Rs. 4,95,051.

TARTARIC ACID BP/USP: From Argentina: Lupin Laboratories Pvt. Ltd., 36 Mts., Rs. 12,64,134.

THIOACETAMIDE: From UK: Pfizer Ltd., 150 kgs., Rs. 1,52,508.

TITANIUM DIOXIDE: From Canada: Universal Capsules P. Ltd., 2,388 kgs., Rs. 1,02,243; Mihir Chemicals, 5,000 kgs., Rs. 1,06,575.

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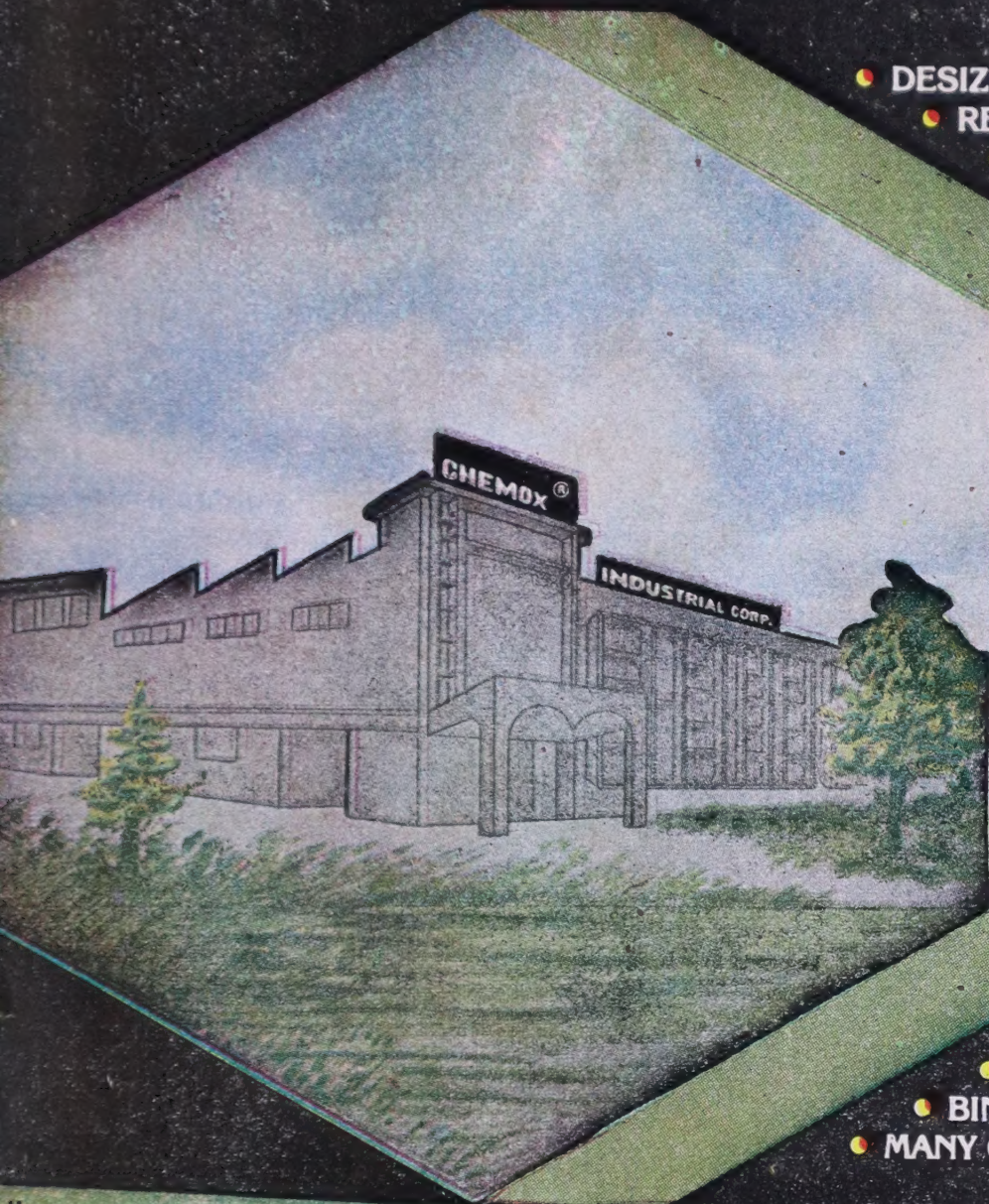
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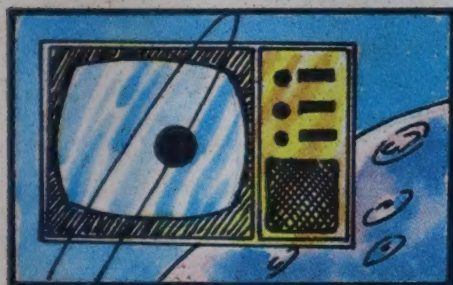
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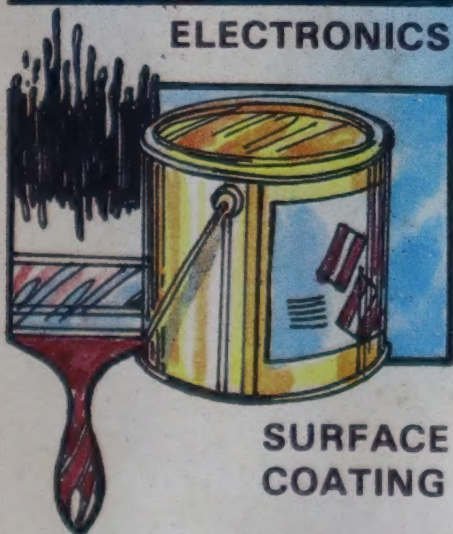
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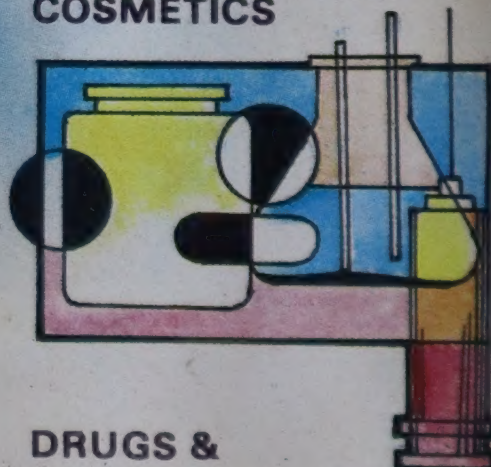
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